Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

NOV 14 2013

14-AMRP-0041

Ms. J. A. Hedges, Program Manager
Nuclear Waste Program
State of Washington
Department of Ecology
3100 Port of Benton Blvd.
Richland, Washington 99354

Dear Ms. Hedges:

TRANSMITTAL OF APPROVED WASTE SITE RECLASSIFICATION FORMS AND SUPPORTING DOCUMENTATION FOR THE 100-D-62, 183-DR HEAD HOUSE SEPTIC TANK; 100-D-77, 183-DR WATER TREATMENT FACILITY; AND 100-D-83:1, 183-DR ACID ADDITION PIPELINE WASTE SITES, REVISION 0

Attached for your use are the approved Waste Site Reclassification Form Nos. 2013-077, 2013-078, and 2013-079 and supporting "Remaining Sites Verification Packages for the 100-D-62, 183-DR Head House Septic Tank; 100-D-77, 183-DR Water Treatment Facility; and 100-D-83:1, 183-DR Acid Addition Pipeline Waste Sites," Rev. 0. If you have questions, please contact me or your staff may contact Tom Post, of my staff, on (509) 376-3232.

Sincerely,

for

Mark S. French, Federal Project Director
for the River Corridor Division

AMRP:TCP

Attachment

cc w/attach:
N. M. Menard, Ecology
Administrative Record, H6-08

cc w/o attach:
R. D. Cantwell, WCH
S. L. Feaster, WCH
T. Q. Howell, WCH
D. L. Plung, WCH
J. P. Shearer, CHPRC

WASTE SITE RECLASSIFICATION FORM

Operable Unit: 100-DR-2 **Control No.:** 2013-077

Waste Site Code(s)/Subsite Code(s): 100-D-62

Reclassification Category: Interim ☒ Final ☐

Reclassification Status: Closed Out ☒ No Action ☐ Rejected ☐

RCRA Postclosure ☐ Consolidated ☐ None ☐

Approvals Needed: DOE ☒ Ecology ☒ EPA ☐

Description of current waste site condition:

The 100-D-62, 183-DR Head House Septic Tank waste site included the septic tank, drainfield, and associated piping located south of the former 183-DR Head House. The 100-D-62 waste site was identified as an additional remove, treat, and dispose site in the *Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington (EPA 2009).

Due to their close proximity, remediation of the 100-D-62, 183-DR Head House Septic Tank; 100-D-77, 183-DR Water Treatment Facility; and 100-D-83:1, 183-DR Acid Addition Pipelines waste sites was combined. A total of five staging pile areas (SPAs) received waste from the 100-D-62, 100-D-77, and 100-D-83:1 remediation. Sampling and data evaluation for three of these five SPAs (North SPA 1, North SPA 2, and North SPA 3) was conducted with the 100-D-62, 100-D-77, and 100-D-83:1 waste sites cleanup verification. Sampling and data evaluation of the other two SPAs was documented in the *Remaining Sites Verification Package for the 100-D-50:6, 183-DR Clearwell Pipelines*, Attachment to Waste Site Reclassification Form 2013-011, Rev. 0, Washington Closure Hanford, Richland, Washington.

Remedial action at the 100-D-62 waste site was conducted on May 2 and 3, 2011. A reinforced concrete septic tank, associated concrete piping, and soil were removed and staged at the SPAs. Approximately 793 bank cubic meters (BCM) (1,037 bank cubic yards [BCY]) of soil and debris were loaded out on July 12 and 13, 2011, for disposal at the Environmental Restoration Disposal Facility (ERDF).

Remedial action at the co-located 100-D-77 and 100-D-83:1 waste sites was performed from May 3, 2011, through July 13, 2011, and extended to 4.6 m (15 ft) below ground surface (bgs). A total of 7,103 BCM (9,290 BCY) of contaminated soil and debris was removed and staged at the SPA locations. Loadout of waste material with subsequent disposal at ERDF was conducted between July 13 and October 18, 2011. Due to elevated mercury measured in excavation area in-process samples, a second-tier excavation design was developed and additional remediation was performed from December 8, 2011, through January 16, 2012. Approximately 7,126 BCM (9,320 BCY) of contaminated soil and debris was removed and staged prior to disposal at ERDF. The second-tier excavation depth extended to 9.5 m (31 ft) bgs.

A verification sample design for the combined 100-D-62, 100-D-77, and 100-D-83:1 waste site remediation was developed. Verification samples for the excavation area were collected on September 4 and 18, 2012. Due to elevated mercury in the excavation, additional remediation was performed on March 13, 2013. Approximately 76 BCM (100 BCY) of contaminated soil and debris was removed from the excavation and staged prior to disposal at ERDF. Final waste loadout of the SPAs was completed on April 1, 2013. Replacement verification samples in the excavation area were collected on March 15, 2013. Two revisions to the sample design were approved and included relocating five SPA sample locations and adding focused samples in the 100-D-83:1 pipelines footprint. The remaining verification samples were collected on April 8 and 29, 2013, and May 29, 2013.

Remediation, verification sampling, and comparison of residual contaminant concentrations against cleanup levels have been performed in accordance with remedial action objectives and goals established by the *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1,*

WASTE SITE RECLASSIFICATION FORM

Operable Unit: 100-DR-2 **Control No.:** 2013-077

Waste Site Code(s)/Subsite Code(s): 100-D-62

100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington (Remaining Sites ROD), U.S. Environmental Protection Agency, Region 10, Seattle, Washington (EPA 1999) and the *Remedial Design Report/Remedial Action Work Plan for the 100 Areas* (100 Area RDR/RAWP), DOE/RL-97-17, Rev. 6, U.S. Department of Energy, Richland Operations Office, Richland, Washington (DOE-RL 2009). The selected action involved (1) excavating the site to the extent required to meet specified soil cleanup levels, (2) disposing of contaminated excavation materials at ERDF, (3) demonstrating through verification sampling that cleanup goals have been achieved, and (4) proposing the site for reclassification to Interim Closed Out.

Basis for reclassification:

In accordance with this evaluation, the verification sampling results support a reclassification of this site to Interim Closed Out. The current site conditions achieve the remedial action objectives and the corresponding remedial action goals established in the Remaining Sites ROD (EPA 1999) and the 100 Area RDR/RAWP (DOE-RL 2009). The results of verification sampling show that residual contaminant concentrations do not preclude any future uses (as bounded by the rural-residential scenario) and allow for unrestricted use of shallow zone soils (i.e., surface to 4.6 m [15 ft] deep). Contamination from the 100-D-62, 100-D-77, and 100-D-83:1 waste sites that extended into the deep zone (greater than 4.6 m [15 ft] bgs) has been removed. Therefore, institutional controls to prevent uncontrolled drilling or excavation into the deep zone of the site are not required. The basis for reclassification is described in detail in the *Remaining Sites Verification Package for the 100-D-62, 183-DR Head House Septic Tank; 100-D-77, 183-DR Water Treatment Facility; and 100-D-83:1, 183-DR Acid Addition Pipelines Waste Sites* (attached).

Regulator comments:

Waste Site Controls:

Engineered Controls: ☐ Yes ☒ No Institutional Controls: ☐ Yes ☒ No O&M Requirements: ☐ Yes ☒ No

If any of the Waste Site Controls are checked Yes, specify control requirements including reference to the Record of Decision, TSD Closure Letter, or other relevant documents:

J. P. Neath	J P Neath	10/15/13
DOE Federal Project Director (printed)	Signature	Date
N. Menard	Nina M. Menard	10/16/13
Ecology Project Manager (printed)	Signature	Date
N/A		
EPA Project Manager (printed)	Signature	Date

WASTE SITE RECLASSIFICATION FORM

Operable Unit: 100-DR-2 **Control No.:** 2013-078

Waste Site Code(s)/Subsite Code(s): 100-D-77

Reclassification Category: Interim ☒ Final ☐

Reclassification Status: Closed Out ☒ No Action ☐ Rejected ☐ RCRA Postclosure ☐ Consolidated ☐ None ☐

Approvals Needed: DOE ☒ Ecology ☒ EPA ☐

Description of current waste site condition:

The 100-D-77, 183-DR Acid Facility, 183-DR Head House, 183-DR Flocculation Basins, 183-DR Sedimentation Basins, and 183-DR Filter Plant waste site encompassed the former 183-DR Water Treatment Facility supporting the 105-DR Reactor. The 100-D-77 waste site was identified as a candidate site for confirmatory sampling in the *Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington (EPA 2009). Portions of the 100-D-77 waste site including the 183-DR Acid Facility, 183-DR Head House, 152C1-DR Substation, and the sample room of the 183-DR Filter Plant were recommended for remediation without confirmatory sampling due to specific operational use.

Due to their close proximity, remediation of the 100-D-62, 183-DR Head House Septic Tank; 100-D-77, 183-DR Water Treatment Facility; and 100-D-83:1, 183-DR Acid Addition Pipelines waste sites was combined. A total of five staging pile areas (SPAs) received waste from the 100-D-62, 100-D-77, and 100-D-83:1 remediation. Sampling and data evaluation for three of these five SPAs (North SPA 1, North SPA 2, and North SPA 3) was conducted with the 100-D-62, 100-D-77, and 100-D-83:1 waste sites cleanup verification. Sampling and data evaluation of the other two SPAs was documented in the *Remaining Sites Verification Package for the 100-D-50:6, 183-DR Clearwell Pipelines*, Attachment to Waste Site Reclassification Form 2013-011, Rev. 0, Washington Closure Hanford, Richland, Washington.

Remedial action at the 100-D-62 waste site was conducted on May 2 and 3, 2011. A reinforced concrete septic tank, associated concrete piping, and soil were removed and staged at the SPAs. Approximately 793 bank cubic meters (BCM) (1,037 bank cubic yards [BCY]) of soil and debris were loaded out on July 12 and 13, 2011, for disposal at the Environmental Restoration Disposal Facility (ERDF).

Remedial action at the co-located 100-D-77 and 100-D-83:1 waste sites was performed from May 3 through July 13, 2011, and extended to 4.6 m (15 ft) below ground surface (bgs). A total of 7,103 BCM (9,290 BCY) of contaminated soil and debris was removed and staged at the SPA locations. Loadout of waste material with subsequent disposal at ERDF was conducted between July 13 and October 18, 2011. Due to elevated mercury measured in excavation area in-process samples, a second-tier excavation design was developed and additional remediation was performed from December 8, 2011, through January 16, 2012. Approximately 7,126 BCM (9,320 BCY) of contaminated soil and debris was removed and staged prior to disposal at ERDF. The second-tier excavation depth extended to 9.5 m (31 ft) bgs.

A verification sample design for the combined 100-D-62, 100-D-77, and 100-D-83:1 waste site remediation was developed. Verification samples for the excavation area were collected on September 4 and 18, 2012. Due to elevated mercury in the excavation, additional remediation was performed on March 13, 2013. Approximately 76 BCM (100 BCY) of contaminated soil and debris were removed from the excavation and staged prior to disposal at ERDF. Final waste loadout of the SPAs was completed on April 1, 2013. Replacement verification samples in the excavation area were collected on March 15, 2013. Two revisions to the sample design were approved and included relocating five SPA sample locations and adding focused samples in the 100-D-83:1 pipelines footprint. The remaining verification samples were collected on April 8 and 29 and May 29, 2013.

WASTE SITE RECLASSIFICATION FORM

Operable Unit: 100-DR-2 **Control No.:** 2013-078

Waste Site Code(s)/Subsite Code(s): 100-D-77

Remediation, verification sampling, and comparison of residual contaminant concentrations against cleanup levels have been performed in accordance with remedial action objectives and goals established by the *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington* (Remaining Sites ROD), U.S. Environmental Protection Agency, Region 10, Seattle, Washington (EPA 1999) and the *Remedial Design Report/Remedial Action Work Plan for the 100 Areas* (100 Area RDR/RAWP), DOE/RL-97-17, Rev. 6, U.S. Department of Energy, Richland Operations Office, Richland, Washington (DOE-RL 2009). The selected action involved (1) excavating the site to the extent required to meet specified soil cleanup levels, (2) disposing of contaminated excavation materials at ERDF, (3) demonstrating through verification sampling that cleanup goals have been achieved, and (4) proposing the site for reclassification to Interim Closed Out.

Basis for reclassification:

In accordance with this evaluation, the verification sampling results support a reclassification of this site to Interim Closed Out. The current site conditions achieve the remedial action objectives and the corresponding remedial action goals established in the Remaining Sites ROD (EPA 1999) and the 100 Area RDR/RAWP (DOE-RL 2009). The results of verification sampling show that residual contaminant concentrations do not preclude any future uses (as bounded by the rural-residential scenario) and allow for unrestricted use of shallow-zone soils (i.e., surface to 4.6 m [15 ft] deep). Contamination from the 100-D-62, 100-D-77, and 100-D-83:1 waste sites that extended into the deep zone (greater than 4.6 m [15 ft] bgs) has been removed. Therefore, institutional controls to prevent uncontrolled drilling or excavation into the deep zone of the site are not required. The basis for reclassification is described in detail in the *Remaining Sites Verification Package for the 100-D-62, 183-DR Head House Septic Tank; 100-D-77, 183-DR Water Treatment Facility; and 100-D-83:1, 183-DR Acid Addition Pipelines Waste Sites* (attached).

Regulator comments:

Waste Site Controls:

Engineered Controls: ☐ Yes ☒ No Institutional Controls: ☐ Yes ☒ No O&M Requirements: ☐ Yes ☒ No

If any of the Waste Site Controls are checked Yes, specify control requirements including reference to the Record of Decision, TSD Closure Letter, or other relevant documents:

J. P. Neath	JP Neath	10/15/13
DOE Federal Project Director (printed)	Signature	Date
N. Menard	Nina M. Menard	10/16/13
Ecology Project Manager (printed)	Signature	Date
N/A		
EPA Project Manager (printed)	Signature	Date

 A-6006-136 (REV 0)

WASTE SITE RECLASSIFICATION FORM

Operable Unit: 100-DR-1 **Control No.:** 2013-079

Waste Site Code(s)/Subsite Code(s): 100-D-83:1

Reclassification Category: Interim ☒ Final ☐

Reclassification Status: Closed Out ☒ No Action ☐ Rejected ☐ RCRA Postclosure ☐ Consolidated ☐ None ☐

Approvals Needed: DOE ☒ Ecology ☒ EPA ☐

Description of current waste site condition:

The 100-D-83:1, 183-DR Acid Addition Pipelines subsite was identified as a candidate site for confirmatory sampling in the *Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington (EPA 2009). The 100-D-83:1 pipelines were recommended for remediation without confirmatory sampling due to historical and process information.

Due to their close proximity, remediation of the 100-D-62, 183-DR Head House Septic Tank; 100-D-77, 183-DR Water Treatment Facility; and 100-D-83:1, 183-DR Acid Addition Pipelines waste sites were combined. A total of five staging pile areas (SPAs) received waste from the 100-D-62, 100-D-77, and 100-D-83:1 remediation. Sampling and data evaluation for three of these five SPAs (North SPA 1, North SPA 2, and North SPA 3) was conducted with the 100-D-62, 100-D-77, and 100-D-83:1 waste sites cleanup verification. Sampling and data evaluation of the other two SPAs was documented in the *Remaining Sites Verification Package for the 100-D-50:6, 183-DR Clearwell Pipelines*, Attachment to Waste Site Reclassification Form 2013-011, Rev. 0, Washington Closure Hanford, Richland, Washington.

Remedial action at the 100-D-62 waste site was conducted on May 2 and 3, 2011. A reinforced concrete septic tank, associated concrete piping, and soil were removed and staged at the SPAs. Approximately 793 bank cubic meters (BCM) (1,037 bank cubic yards [BCY]) of soil and debris were loaded out on July 12 and 13, 2011, for disposal at the Environmental Restoration Disposal Facility (ERDF).

Remedial action at the co-located 100-D-77 and 100-D-83:1 waste sites was performed from May 3 through July 13, 2011, and extended to 4.6 m (15 ft) below ground surface (bgs). A total of 7,103 BCM (9,290 BCY) of contaminated soil and debris was removed and staged at the SPA locations. Loadout of waste material with subsequent disposal at ERDF was conducted between July 13 and October 18, 2011. Due to elevated mercury measured in excavation area in-process samples, a second tier excavation design was developed and additional remediation was performed from December 8, 2011 through January 16, 2012. Approximately 7,126 BCM (9,320 BCY) of contaminated soil and debris were removed and staged prior to disposal at ERDF. The second tier excavation depth extended to 9.5 m (31 ft) bgs.

A verification sample design for the combined 100-D-62, 100-D-77, and 100-D-83:1 waste site remediation was developed. Verification samples for the excavation area were collected on September 4 and 18, 2012. Due to elevated mercury in the excavation, additional remediation was performed on March 13, 2013. Approximately 76 BCM (100 BCY) of contaminated soil and debris were removed from the excavation and staged prior to disposal at ERDF. Final waste loadout of the SPAs was completed on April 1, 2013. Replacement verification samples in the excavation area were collected on March 15, 2013. Two revisions to the sample design were approved and included relocating five SPA sample locations and adding focused samples in the 100-D-83:1 pipelines footprint. The remaining verification samples were collected on April 8 and 29, 2013, and May 29, 2013.

Remediation, verification sampling, and comparison of residual contaminant concentrations against cleanup levels have been performed in accordance with remedial action objectives and goals established by the *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1,*

WASTE SITE RECLASSIFICATION FORM

Operable Unit: 100-DR-1 **Control No.:** 2013-079

Waste Site Code(s)/Subsite Code(s): 100-D-83:1

100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington (Remaining Sites ROD), U.S. Environmental Protection Agency, Region 10, Seattle, Washington (EPA 1999) and the *Remedial Design Report/Remedial Action Work Plan for the 100 Areas* (100 Area RDR/RAWP), DOE/RL-97-17, Rev. 6, U.S. Department of Energy, Richland Operations Office, Richland, Washington (DOE-RL 2009). The selected action involved: (1) excavating the site to the extent required to meet specified soil cleanup levels, (2) disposing of contaminated excavation materials at ERDF, (3) demonstrating through verification sampling that cleanup goals have been achieved, and (4) proposing the site for reclassification to Interim Closed Out.

Basis for reclassification:

In accordance with this evaluation, the verification sampling results support a reclassification of this site to Interim Closed Out. The current site conditions achieve the remedial action objectives and the corresponding remedial action goals established in the Remaining Sites ROD (EPA 1999) and the 100 Area RDR/RAWP (DOE-RL 2009). The results of verification sampling show that residual contaminant concentrations do not preclude any future uses (as bounded by the rural-residential scenario) and allow for unrestricted use of shallow zone soils (i.e., surface to 4.6 m [15 ft] deep). Contamination from the 100-D-62, 100-D-77, and 100-D-83:1 waste sites that extended into the deep zone (greater than 4.6 m [15 ft] bgs) has been removed. Therefore, institutional controls to prevent uncontrolled drilling or excavation into the deep zone of the site are not required. The basis for reclassification is described in detail in the *Remaining Sites Verification Package for the 100-D-62, 183-DR Head House Septic Tank; 100-D-77, 183-DR Water Treatment Facility; and 100-D-83:1, 183-DR Acid Addition Pipelines Waste Sites* (attached).

Regulator comments:

Waste Site Controls:

Engineered Controls: ☐ Yes ☒ No Institutional Controls: ☐ Yes ☒ No O&M Requirements: ☐ Yes ☒ No

If any of the Waste Site Controls are checked Yes, specify control requirements including reference to the Record of Decision, TSD Closure Letter, or other relevant documents:

J. P. Neath	JP Neath	10/15/13
DOE Federal Project Director (printed)	Signature	Date
N. Menard	Nina M. Menard	10/16/13
Ecology Project Manager (printed)	Signature	Date
N/A		
EPA Project Manager (printed)	Signature	Date

 A-6006-136 (REV 0)

REMAINING SITES VERIFICATION PACKAGE FOR THE 100-D-62, 183-DR HEAD HOUSE SEPTIC TANK; 100-D-77, 183-DR WATER TREATMENT FACILITY; AND 100-D-83:1, 183-DR ACID ADDITION PIPELINE WASTE SITES

Attachment to Waste Site Reclassification Forms 2013-077, 2013-078, and 2013-079

October 2013

REMAINING SITES VERIFICATION PACKAGE FOR THE 100-D-62, 183-DR HEAD HOUSE SEPTIC TANK; 100-D-77, 183-DR WATER TREATMENT FACILITY; AND 100-D-83:1, 183-DR ACID ADDITION PIPELINE WASTE SITES

EXECUTIVE SUMMARY

The 100-D-62, 183-DR Head House Septic Tank and 100-D-77, 183-DR Water Treatment Facility, located within the 100-DR-2 Operable Unit, and the 100-D-83:1, 183-DR Acid Addition Pipelines Waste Sites, located within the 100-DR-1 Operable Unit, underwent a combined remedial action due to their close proximity. The three waste sites were also combined for the purpose of verification sampling. The 100-D-62 waste site includes the septic tank, drainfield, and associated piping located south of the former 183-DR Head House. The 100-D-77 waste site includes the former 183-DR Head House, 183-DR Acid Facility, 183-DR Flocculation Basins, 183-DR Sedimentation Basins, and the 183-DR Filter Building. The 100-D-83:1 waste site was located north of the 183-DR Head House and included 35 pipeline segments that transported low-pressure steam, sulfuric acid, and lime slurry. Each of these waste sites was recommended for remedial action without confirmatory sampling (WCH 2008a, 2008b, 2010).

A total of five staging pile areas (SPAs) received waste from the 100-D-62, 100-D-77, and 100-D-83:1 remediation. Sampling and data evaluation for three of the five SPAs (North SPA 1, North SPA 2, and North SPA 3) were conducted with the 100-D-62, 100-D-77, and 100-D-83:1 waste sites cleanup verification. Sampling and data evaluation of the other two SPAs were performed and documented with the 100-D-50:6, 185-DR Clearwell Drain Pipelines cleanup verification (WCH 2012c, 2013d).

Remedial action at the 100-D-62 waste site was conducted on May 2 and 3, 2011. A reinforced concrete septic tank, associated concrete piping, and soil were removed as part of the remediation and staged at the SPAs. Approximately 793 bank cubic meters (BCM) (1,037 bank cubic yards [BCY]) of soil and debris were loaded out on July 12 and 13, 2011, for disposal at the Environmental Restoration Disposal Facility (ERDF).

Remedial action at the 100-D-77 waste site began on May 3, 2011, and continued through July 13, 2011. The 100-D-83:1 pipelines were fully removed during the 100-D-77 remediation. The tier 1 remediation continued to approximately 4.6 m (15 ft) below ground surface (bgs). Approximately 7,103 BCM (9,290 BCY) of contaminated soil and debris was removed and staged at the SPAs prior to disposal at the ERDF.

A 20-m (65.6-ft)-long, concrete-encased section of the 100-D-56:2, South Portion of 100-D-56 pipelines had been left in place during the previous 100-D-56 pipeline remediation at the entry of the pipeline into the 183-DR Head House. This remaining portion of 100-D-56:2 was removed during the 100-D-77 remediation. The 100-D-56:2 subsite consisted of the chemical supply lines (sodium dichromate and sodium silicate) that exited the west side of the

185-D Building and extended to the 183-DR Head House. Loadout and disposal of 100-D-77 and 100-D-83:1 waste, including material from the remaining 100-D-56:2 pipelines, was conducted between July 13 and October 18, 2011.

At the completion of the tier 1 remediation, in-process soil samples were collected to determine if additional remediation of the waste site was necessary. The in-process sample data showed mercury concentrations exceeding the direct exposure cleanup level. Therefore, a second tier of excavation was designed and implemented.

Tier 2 remediation began on December 8, 2011, and continued through January 16, 2012. The excavation extended up to 9.5 m (31 ft) bgs. Approximately 7,126 BCM (9,320 BCY) of contaminated soil and debris was removed and staged at the SPAs. Loadout and disposal of the tier 2 waste to ERDF began on December 14, 2011.

Verification samples of the 100-D-62, 100-D-77, and 100-D-83:1 excavation area were collected on September 18, 2012, per the *Work Instruction for Verification Sampling of the 100-D-77, 183-DR Water Treatment Facility;100-D-62, 183-DR Head House Septic Tank; and 100-D-83:1, 183-DR Acid Addition Pipelines Waste Sites* (VWI) (WCH 2013e). An additional verification sample at the former 183-DR Filter Building sample room (100-D-77) was collected on September 4, 2012, per the *Work Instruction for Verification Sampling of the 100-D-50:6, 183-DR Clearwell Drain Pipelines Waste Site* (WCH 2012c). Mercury above direct exposure remedial action goals (RAGs) was measured at one sample location (EXC-4). Benzo(a)pyrene was measured above direct exposure RAGs at two locations (EXC-3 and FS-1) at the west end of the excavation. Elevated benzo(a)pyrene and other polycyclic aromatic hydrocarbons (PAH) results were attributed to residual asphalt in the excavation. Demolition and removal of an asphalt road at the west end of the excavation had been conducted during previous deactivation, decontamination, decommissioning, and demolition (D4) activities and prior to remediation.

In agreement with the Washington State Department of Ecology (WCH 2012b), additional soil was removed at and around the sample location with elevated mercury (EXC-4) on March 15, 2013. An additional 76 BCM (100 BCY) of contaminated soil and debris was removed from the excavation and staged prior to disposal at ERDF. The area in which additional removal was performed also included the FS-1 focused sample location. After removal, replacement verification samples were collected on March 15, 2013, at both the EXC-4 and FS-1 locations. The agreement for additional remediation included disposition of the benzo(a)pyrene result at location EXC-3 as cross-contamination with asphalt (WCH 2012b).

Verification sampling of the three SPAs, North SPA 1, North SPA 2, and North SPA 3, was initiated on April 8, 2013. Based on field observations, it was determined that the boundary used for the North SPA 3 area in the VWI was incorrect and required modification. New, randomly determined coordinates were identified for the five North SPA 3 verification sample locations using an updated boundary and the revised VWI (Rev. 1) was approved. The final five verification samples from North SPA 3 were collected April 29, 2013.

Three additional focused samples were approved in Rev. 2 of the sample design (WCH 2013e) to specifically address the remediation of 100-D-83:1 pipelines. The 100-D-83:1 waste site was fully removed within the 100-D-77 excavation. Verification samples were collected from these three locations on May 29, 2013.

The verification sampling results indicate that the waste removal action achieved compliance with the remedial action objectives (RAOs) and RAGs established in the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (RDR/RAWP) (DOE-RL 2009b) and the *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington* (Remaining Sites ROD) (EPA 1999).

A summary of the cleanup evaluation for the results from verification sampling against the applicable criteria is presented in Table ES-1. The results of verification sampling are used to make reclassification decisions for the 100-D-62, 100-D-77, and 100-D-83:1 waste sites in accordance with the TPA-MP-14 procedure in the *Tri-Party Agreement Handbook Management Procedures* (DOE-RL 2011).

Table ES-1. Summary of Remedial Action Goals for the 100-D-62, 100-D-77, and 100-D-83:1 Waste Sites. (2 Pages)

Regulatory Requirement	Remedial Action Goals	Results	Remedial Action Objectives Attained?
Direct Exposure – Radionuclides	Attain dose rate of <15 mrem/yr above background for 1,000 years.	Radionuclides were not COPCs for the 100-D-62, 100-D-77, and 100-D-83:1 waste sites.	NA
Direct Exposure – Nonradionuclides	Attain individual COPC RAGs.	All individual COPC concentrations in shallow zone decision units are below the direct exposure criteria.	Yes
Risk Requirements – Nonradionuclides	Attain a hazard quotient of <1 for all individual noncarcinogens.	The hazard quotient determined from shallow zone decision units is <1.	Yes
	Attain a cumulative hazard quotient of <1 for noncarcinogens.	The cumulative hazard quotient determined from shallow zone decision units (2.1×10^{-1}) is <1.	
	Attain an excess cancer risk of $<1 \times 10^{-6}$ for individual carcinogens.	The excess cancer risk for carcinogens determined from shallow zone decision units is $<1 \times 10^{-6}$.	
	Attain a cumulative excess cancer risk of $<1 \times 10^{-5}$ for carcinogens.	The total excess cancer risk determined from shallow zone decision units (1.7×10^{-6}) is $<1 \times 10^{-5}$.	

Table ES-1. Summary of Remedial Action Goals for the 100-D-62, 100-D-77, and 100-D-83:1 Waste Sites. (2 Pages)

Regulatory Requirement	Remedial Action Goals	Results	Remedial Action Objectives Attained?
Groundwater/River Protection – Radionuclides	Attain single-COPC groundwater and river protection RAGs.	Radionuclides were not COPCs for the 100-D-62, 100-D-77, and 100-D-83:1 waste sites.	NA
	Attain national primary drinking water standards [a]: 4 mrem/yr (beta/gamma) dose rate to target receptor/organs.	Radionuclides were not COPCs for the 100-D-62, 100-D-77, and 100-D-83:1 waste sites.	
	Meet drinking water standards for alpha emitters: the most stringent of 15 pCi/L MCL or 1/25th of the derived concentration guides from DOE Order 5400.5 [b].	Radionuclides were not COPCs for the 100-D-62, 100-D-77, and 100-D-83:1 waste sites.	
	Meet total uranium standard of 30 µg/L (21.2 pCi/L) [c].	Radionuclides were not COPCs for the 100-D-62, 100-D-77, and 100-D-83:1 waste sites.	
Groundwater/River Protection – Nonradionuclides	Attain individual nonradionuclide groundwater and river cleanup requirements.	Residual concentrations of vanadium, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene exceed soil RAGs for groundwater and/or river protection. However, based on RESRAD modeling discussed in Appendix C of the 100 Area RDR/RAWP (DOE-RL 2009b), it is predicted that these constituents will not reach groundwater (and thus the Columbia River) within 1,000 years [d].	Yes

[a] "National Primary Drinking Water Regulations" (40 *Code of Federal Regulations* 141).
[b] *Radiation Protection of the Public and the Environment* (DOE Order 5400.5).
[c] Based on the isotopic distribution of uranium in the 100 Area, the 30 µg/L MCL corresponds to 21.2 pCi/L. Concentration-to-activity calculations are documented in *Calculation of Total Uranium Activity Corresponding to a Maximum Contaminant Level for Total Uranium of 30 Micrograms per Liter in Groundwater* (BHI 2001).
[d] Based on RESRAD modeling discussed in Appendix C of the RDR/RAWP (DOE-RL 2009b), the residual concentrations of vanadium, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd) are not predicted to migrate vertically within 1,000 years (based on the lowest distribution coefficient of the contaminants exceeding RAGs, chrysene, with a distribution coefficient value of 200 mL/g). The distance to groundwater from the bottom of the excavation area is 16 m (52.5 ft). Therefore, residual concentrations of these constituents are predicted to be protective of groundwater and the Columbia River.

COPC = contaminant of potential concern
MCL = maximum contaminant level
RAG = remedial action goal
RDR/RAWP = Remedial Design Report/Remedial Action Work Plan
RESRAD = RESidual RADioactivity (dose model)

In accordance with this evaluation, the verification sampling results support a reclassification of this subsite to Interim Closed Out. The current site conditions achieve the RAOs and the corresponding RAGs of the RDR/RAWP (DOE-RL 2009b) and the Remaining Sites ROD (EPA 1999). The results also demonstrate that residual contaminant concentrations support unrestricted future use of shallow zone soil (surface to 4.6 m [15 ft] bgs), and that contaminant levels remaining in the soil are protective of groundwater and the Columbia River. Contamination from the 100-D-62, 100-D-77, and 100-D-83:1 waste sites that extended into the deep zone (greater than 4.6 m [15 ft] bgs) has been removed; therefore, institutional controls to prevent uncontrolled drilling or excavation into the deep zone of the site are not required.

Soil cleanup levels were established in the Remaining Sites ROD (EPA 1999) based in part on a limited ecological risk assessment. Although not required by the Remaining Sites ROD, a comparison against ecological risk screening levels has been made for the 100-D-62, 100-D-77, and 100-D-83:1 waste site contaminants of potential concern and other constituents (Appendix A). The higher of the maximum or statistical values were considered for comparison. Ecological screening levels from *Washington Administrative Code* 173-340 were exceeded for boron, mercury, and vanadium. The U.S. Environmental Protection Agency's ecological soil screening levels were exceeded for antimony, manganese, vanadium, zinc, and high molecular weight PAH. Exceedance of screening values is intended to trigger additional evaluation and does not necessarily indicate the existence of risk to ecological receptors. Because concentrations of antimony, manganese, mercury, and zinc are below Hanford Site or Washington State background values (note that state background values are only used when Hanford Site background values are not available), it is believed that the presence of these constituents does not pose a risk to ecological receptors. All exceedances will be evaluated in the context of additional lines of evidence for risk to ecological receptors as part of the final closeout decision for this site.

REMAINING SITES VERIFICATION PACKAGE FOR THE 100-D-62, 183-DR HEAD HOUSE SEPTIC TANK; 100-D-77, 183-DR WATER TREATMENT FACILITY; AND 100-D-83:1, 183-DR ACID ADDITION PIPELINE WASTE SITES

STATEMENT OF PROTECTIVENESS

The 100-D-62, 100-D-77, and 100-D-83:1 waste sites verification sampling data, site evaluations, and supporting documentation demonstrate that this site meets the objectives established in the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (RDR/RAWP) (DOE-RL 2009b) and the *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington* (Remaining Sites ROD) (EPA 1999). These results show that residual soil concentrations support future land uses that can be represented (or bounded) by a rural-residential scenario. The results also demonstrate that residual contaminant concentrations support unrestricted future use of shallow zone soil (i.e., surface to 4.6 m [15 ft]), and that contaminant levels remaining in the soil are protective of groundwater and the Columbia River. Contamination from the 100-D-62, 100-D-77, and 100-D-83:1 waste sites that extended into the deep zone has been removed; therefore, institutional controls to prevent uncontrolled drilling or excavation into the deep zone of the site are not required.

Soil cleanup levels were established in the Remaining Sites ROD (EPA 1999) based in part on a limited ecological risk assessment. Although not required by the Remaining Sites ROD, a comparison against ecological risk screening levels has been made for the 100-D-62, 100-D-77, and 100-D-83:1 waste site contaminants of potential concern (COPCs) and other constituents (Appendix A). The higher of the maximum or statistical values were considered for comparison. Ecological screening levels from *Washington Administrative Code* (WAC) 173-340 were exceeded for boron, mercury, and vanadium. The U.S. Environmental Protection Agency's (EPA's) ecological soil screening levels were exceeded for antimony, manganese, vanadium, zinc, and high molecular weight polyaromatic hydrocarbons (PAH). Exceedance of screening values is intended to trigger additional evaluation and does not necessarily indicate the existence of risk to ecological receptors. Because concentrations of antimony, manganese, mercury, and zinc are below Hanford Site or Washington State background values (note that state background values are only used when Hanford Site background values are not available), it is believed that the presence of these constituents does not pose a risk to ecological receptors. All exceedances will be evaluated in the context of additional lines of evidence for risk to ecological receptors as part of the final closeout decision for this site.

GENERAL SITE INFORMATION AND BACKGROUND

The 100-D-62, 100-D-77, and 100-D-83:1 waste sites are located west of the 105-DR Reactor (Figure 1). The 100-D-62 and 100-D-77 waste sites are within the 100-DR-2 Operable Unit of the Hanford Site. The 100-D-83:1 subsite is within the 100-DR-1 Operable Unit of the Hanford Site.

100-D-62, 183-DR Head House Septic Tank

The 100-D-62, 183-DR Head House septic tank waste site includes the septic tank, drainfield, and associated piping. The septic tank was located approximately 15.2 m (50 ft) south of the 183-DR Head House. The drainfield pipeline extended 6.1 m (20 ft) from the southern end of the septic tank. The overall dimensions of the tile field measured 8.2 m (27 ft) long by 4.3 m (14 ft) wide. The septic system received sanitary sewage from the 183-DR Head House. The entire 183-DR Water Treatment Facility was a nonradiological area; therefore, the 100-D-62 septic system waste site was not considered radiologically contaminated.

100-D-77, 183-DR Water Treatment Facility

The 100-D-77 waste site is the former 183-DR Reactor Water Treatment Facility and is located approximately 350 m (1,150 ft) west of the 105-DR Reactor. The site is immediately west of the 183-DR clearwells. All facilities in the waste site were demolished to grade in 1978. The 100-D-77 waste site includes the former 183-DR Head House, train shed, 183-DR Filter Building, 183-DR Acid Facility, 183-DR Flocculation Basins, and 183-DR Sedimentation Basins. The site also includes the former 152C1-DR substation that had been located on the north side of the 183-DR Head House.

History

The 183-DR Water Treatment Facility chemically treated and filtered raw Columbia River water prior to use of the water to cool 105-DR Reactor components (Figures 2 and 3). The 183-DR Water Treatment Facility was constructed in 1950 and demolished in 1978. Debris from the facility deactivation, decontamination, decommissioning, and demolition (D4) was buried in the sedimentation basins (WHC 1991). Of primary concern was the use of sulfuric acid and sodium dichromate. Sulfuric acid, potentially containing impurities such as lead and mercury, was added to raw river water prior to entry into the flocculation basins. Sodium dichromate was added as the final water treatment step in the sample room located on the east side of the 183-DR Filter Building.

Figure 1. Overall Site Location of the 100-D-62, 100-D-77, and 100-D-83:1 Waste Sites.

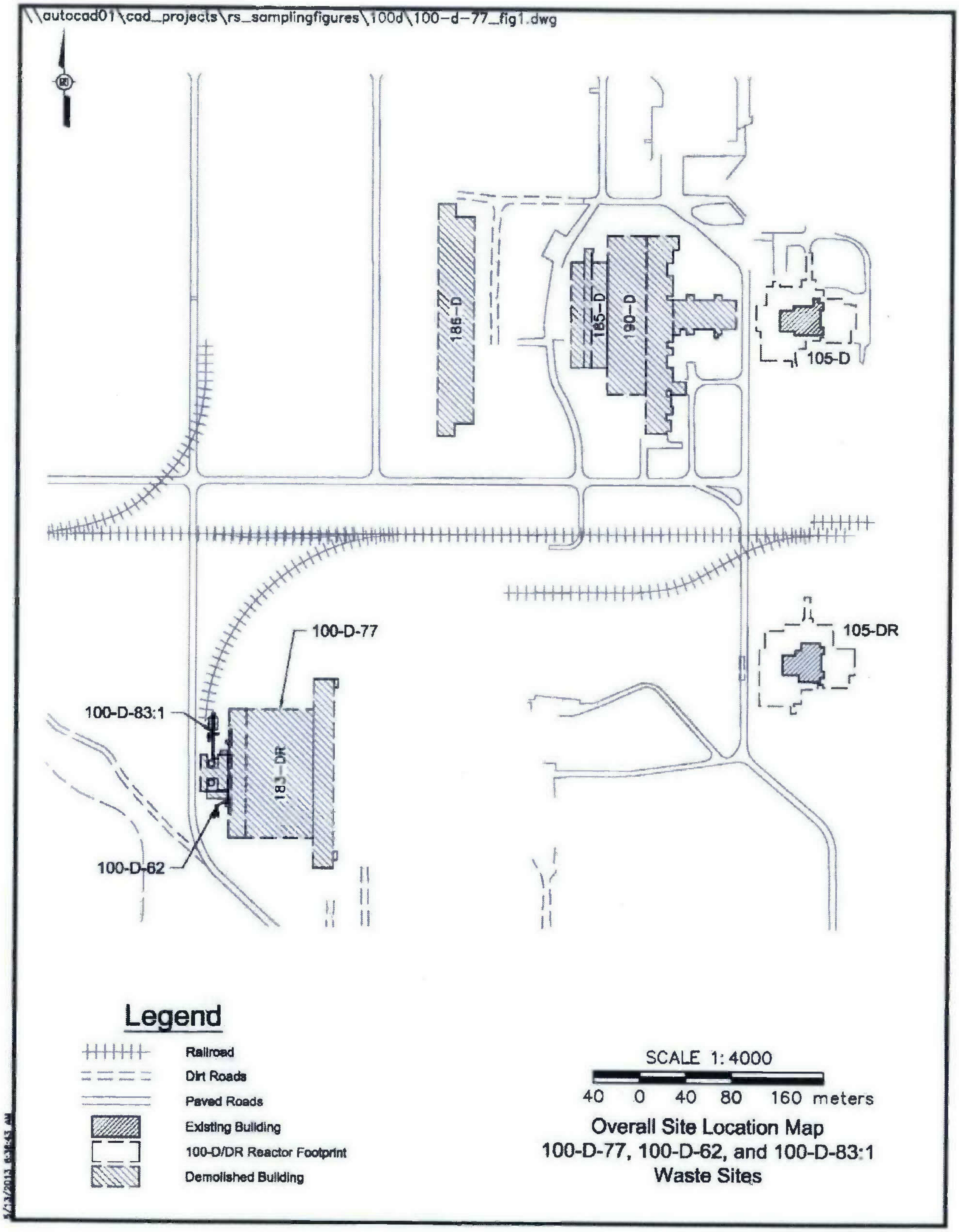


Figure 2. Historical Aerial Photograph of the 183-DR Water Treatment Facility.

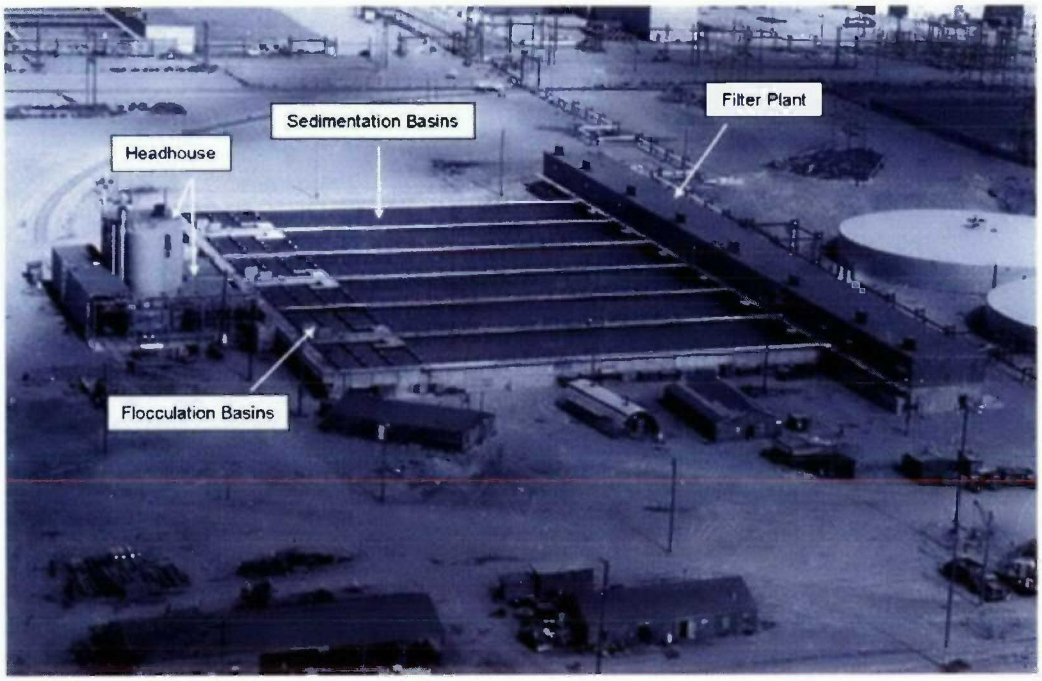
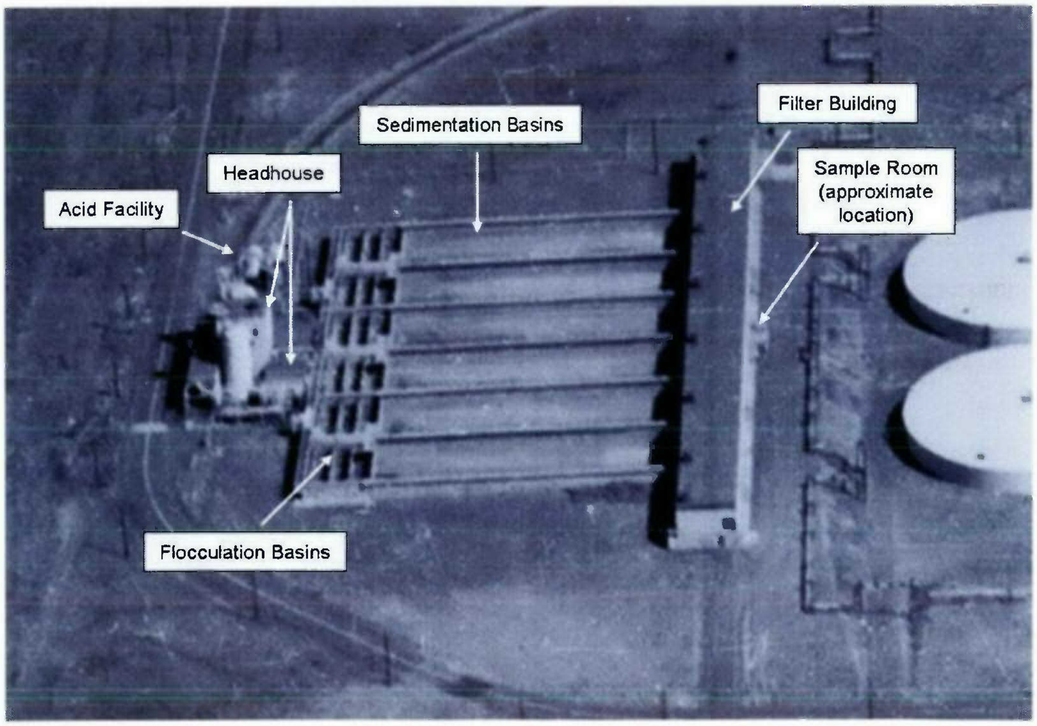


Figure 3. Historical Aerial Photograph of the 183-DR Water Treatment Facility Showing Location of the Acid Facility and the Filter Building Sample Room (1966).



As depicted in Figure 4, the 183-DR Acid Facility was located to the north of the 183-DR Head House and contained above-grade acid-holding tanks and transfer units. A car spot was used for unloading sulfuric acid from railcars. The acid was then transferred to two above-grade acid storage tanks using two acid pumps located directly northeast of the car spot. From the storage tanks, acid was transferred to an elevated acid head tank and finally to the mixing flume of the flocculation basin. A pipe trench was also located between the two acid storage tanks. There was an acid trap at the north end of the trench while the south end of the trench extended approximately 38 m (125 ft) to meet the 183-DR Head House at the northeast end where the pipes enter the building. Two drywells and a sump were located near the car spot and acid storage tank.

The 152C1-DR substation was located southeast of the acid facility at the northeast side of the 183-DR Head House (Figure 4). There were two 225-KVA transformers on a concrete pad located at the southern end of the substation footprint. The transformers were located next to each other in an east-west orientation near the southern boundary. The structure and transformers were removed during previous D4 activities.

The 183-DR Head House was the westernmost building of the water treatment facility and served as a receiving, storage, and transfer point for sodium dichromate solutions (Figure 5). The building was 34 m by 24 m (110 ft by 80 ft), had three floors and a basement, and supplied an appropriate mixture of chemicals to provide the desired treated water to the 105-DR Reactor. Other dry chemicals such as lime, sodium silicate, and ferric sulfate were received by railcar at the adjacent train shed. Outside the building were two chemical storage silos measuring 15 m (48 ft) in height and 2.4 m (8 ft) in diameter.

The 183-DR Head House received 10% sodium dichromate solution from the 185-D Building through a 7.6-cm (3-in.)-diameter pipeline that connected with one or more tanks, each with a 15,000-L (4,000-gal) capacity. This pipeline was part of the 100-D-56:2 waste site, which is the south portion of 100-D-56 pipeline waste site (Figure 5). The sodium dichromate storage tanks were located in the equipment room on the ground floor in the northeast corner of the 183-DR Head House. From the storage tanks, the sodium dichromate solution was pumped via two 1.9-cm (0.75-in.)-diameter overhead lines across the flocculation and sedimentation basins to the sample room and mixing pumps on the far east end of the 183-DR Filter Building.

River water from the 182-D Building entered the head house through two 91-cm (36-in.)-diameter steel pipes. The 183-DR Head House contained inlet control valves, a flash mixer chamber, chlorinators, as well as ferric sulfate, lime, and silicate storage, and the chemical feeding equipment used for water treatment. River water entered a mixing flume on the west side of the 183-DR Flocculation Basins for initial treatment. Sulfuric acid, potentially containing lead and mercury contaminants, was added to incoming river water in the flume to adjust the pH. Water then moved to the flocculation and sedimentation basins. The sedimentation basins were designed to allow heavier particulate matter to settle out of the water before entering the filter building. In total, there were six flocculation and six sedimentation basins. The structure containing the flocculation and sedimentation basins and flume measured 114 by 75 m (374 by 75 ft).

Figure 4. Location of the Former 183-DR Acid Facility, 152C1-DR Substation, and 100-D-83:1 Pipelines.

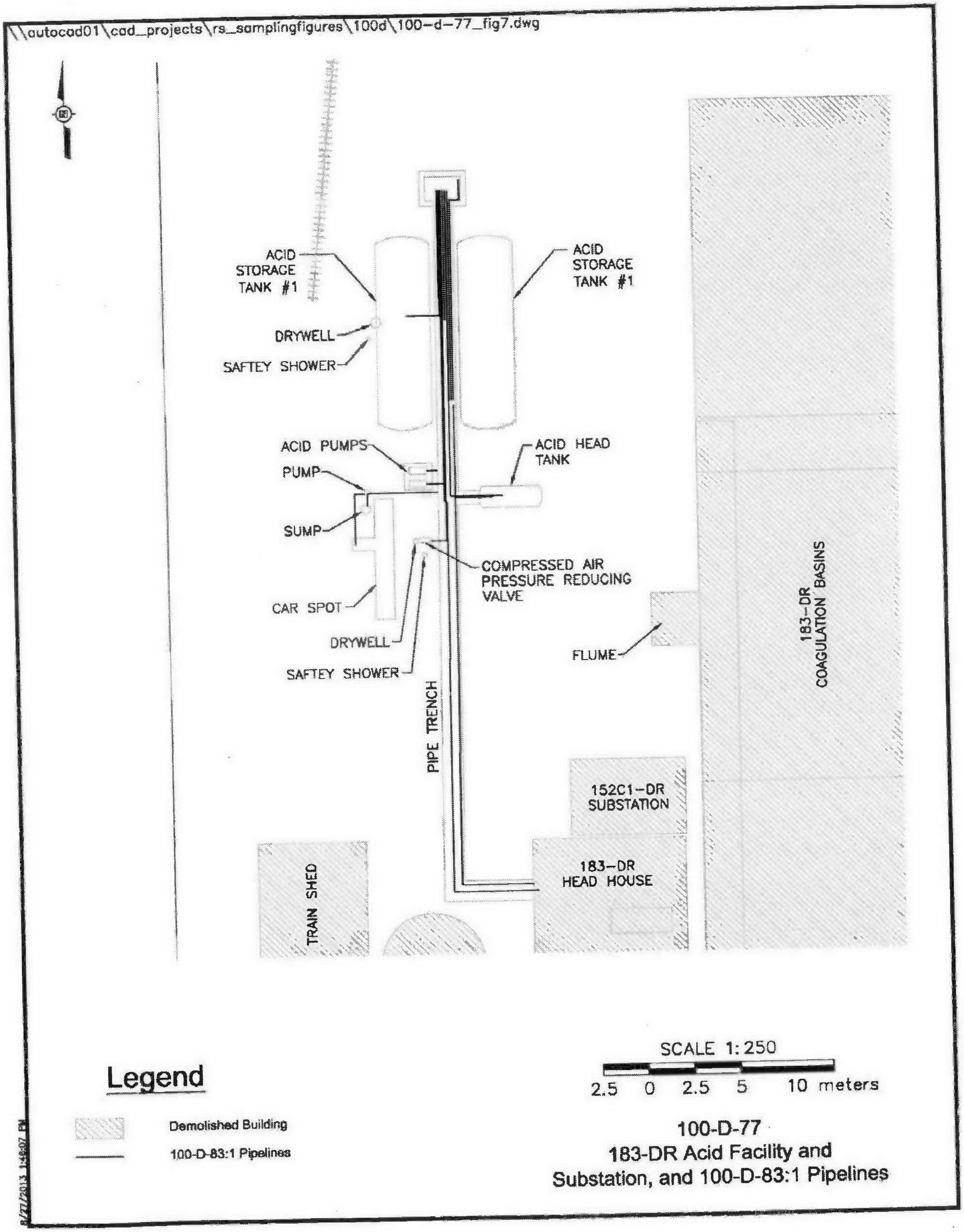
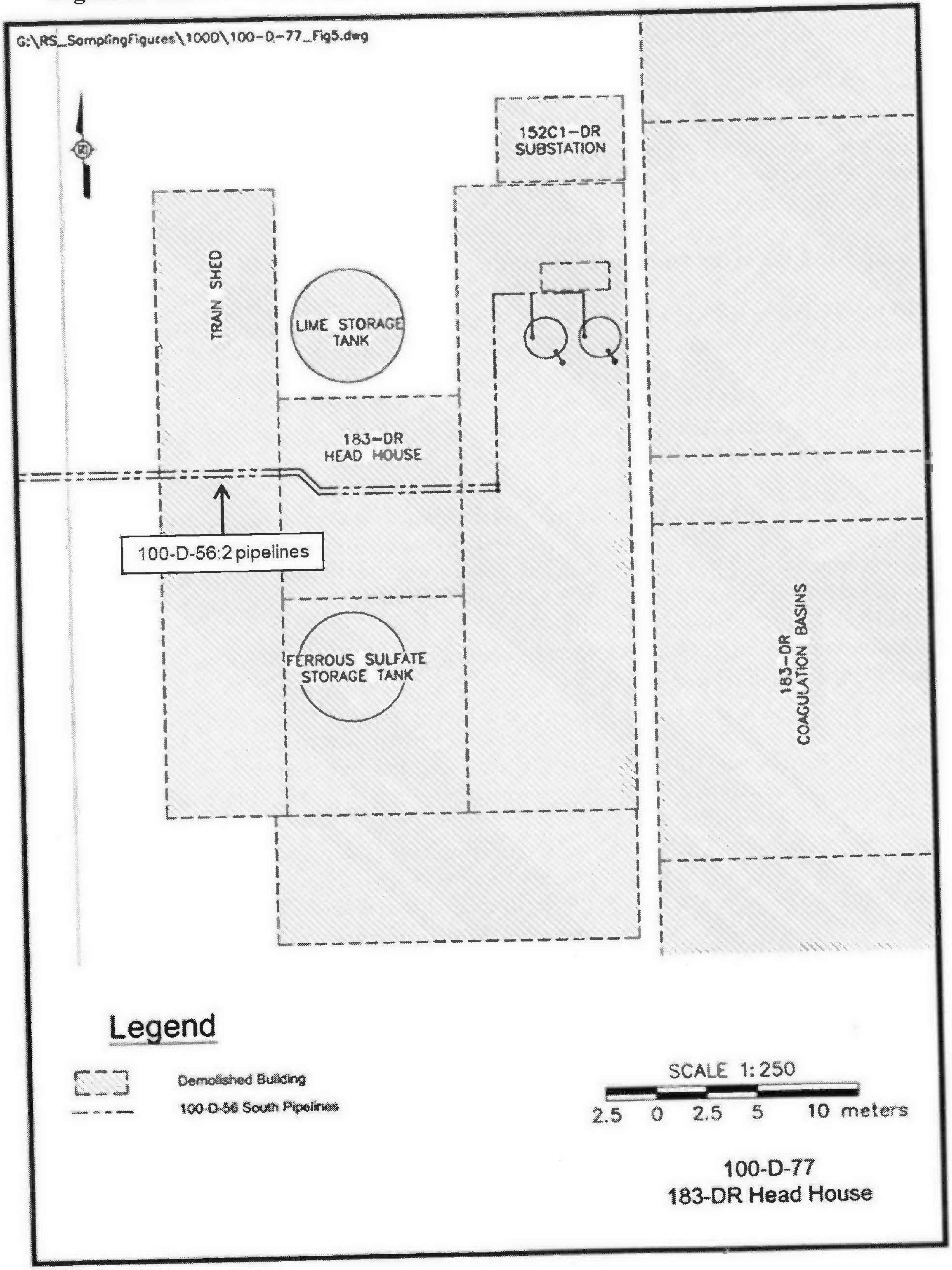


Figure 5. 183-DR Head House with Location of the 100-D-56:2 South Pipelines.



The 183-DR Filter Building was a 171- by 16-m (560- by 52-ft) building located to the east of the sedimentation basins (Figure 5). The facility received the acid treated water from the sedimentation basins. The water was filtered through 10 filter basins made of anthracite, sand, and gravel. After filtration, sodium dichromate was added to the water. Solutions of 10% sodium dichromate from the 183-DR Head House entered the sample room of the filter building via overhead pipelines. The sample room was located on the east side of the facility midway between the north and south end of the building (Figure 6). At this point, sodium dichromate solution was directly added to the treated water and then mixed in a mixing flume on the east side of the filter building.

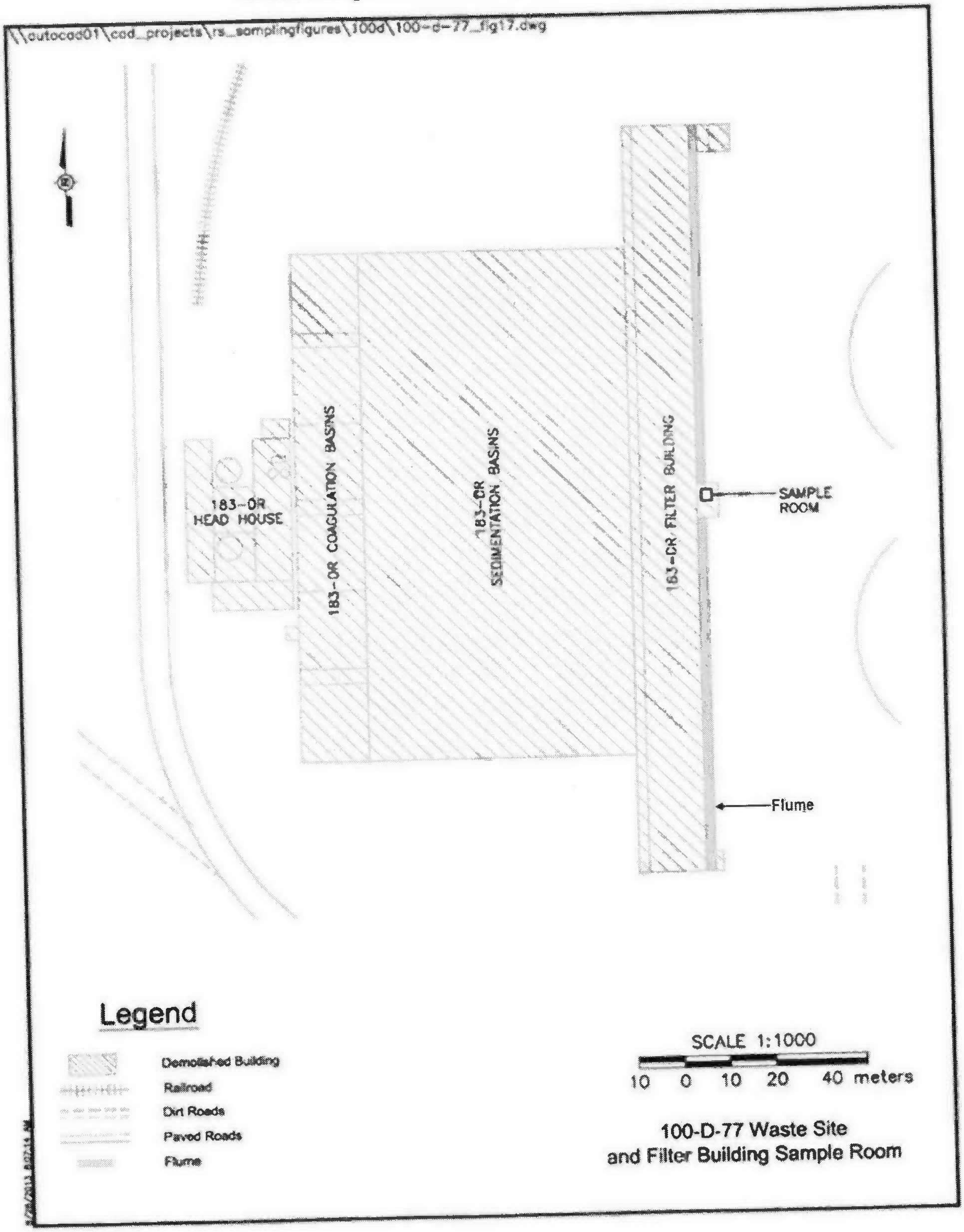
100-D-83:1 183-DR Acid Addition Pipelines

The 100-D-83 Treated Water Pipelines waste site is a compilation of 89 pipelines that conveyed treated water with chemical additions or treatment chemicals associated with pre-reactor cooling water. Raw water from the Columbia River and sanitary service water prior to addition or inclusion of chemical additives for the cooling water are excluded from this site. The 100-D-83 pipelines transferred chemical products to the water treatment facilities and transferred treated cooling water to the reactor and laboratory facilities.

The 100-D-83 pipelines were separated into subsites based on geographical area and the recommended remedial action pathway. The 100-D-83:1, 183-DR Acid Addition Pipelines subsite encompassed 35 pipeline segments associated with the 183-DR Acid Facility (100-D-77) and included low-pressure steam, sulfuric acid, and lime slurry, all located north of the 183-DR Head House (Figure 4). The 100-D-83:1 pipelines transferred sulfuric acid from the acid facility to the 183-DR Head House. The majority of the pipeline segments were contained in the acid pipe trench (100-D-77).

Sulfuric acid was received by railroad car and stored in two outside above-ground acid storage tanks (Figure 4). The acid was fed by gravity to the 183-DR Head House by maintaining the supply in the acid head tank. The piping between the head tank and the 183-DR Head House was all above-grade. Sulfuric acid was added to the raw water before coagulation and filtration to reduce the pH below 7.5 and to aid in the suspension of solids. After filtration, lime was added to the water to raise the pH to between 7.5 and 7.8 (BHI 2005). Lime slurry was returned to the acid trench for neutralization of the waste acid. Process knowledge concerning the chemical makeup of sulfuric acid used in historical water treatment processes on the Hanford Site has determined that much of the sulfuric acid was purchased from a mining company and contained mercury and lead.

Figure 6. 183-DR Water Treatment Facility Showing Location of the Sample Room in the Filter Building.



CONFIRMATORY SAMPLING

The 100-D-62, 100-D-77, and 100-D-83:1 waste sites were each recommended for remediation without confirmatory sampling (WCH 2008a, 2008b, 2010).

REMEDIAL ACTION DECISIONS

The 100-D-62 waste site was identified as an additional remove, treat, and dispose site in the *Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington*, (100 Area ESD) (EPA 2009). The site was recommended for remediation due to potentially significant confirmatory sampling costs relative to generally low remediation costs for septic systems and because the waste site was associated with the 183-DR Head House with suspected hexavalent chromium contamination (WCH 2008a).

The 100-D-77 waste site was identified as a candidate site for confirmatory sampling in the 100 Area ESD (EPA 2009). Portions of the 100-D-77 waste site, which encompasses the entire 183-DR Water Treatment Facility, were recommended for remediation without confirmatory sampling due to specific operational use (WCH 2008b). The former 183-DR Head House, including the remaining portion of the 100-D-56:2 pipelines at the west side of the head house, and the sample room on the east side of the 183-DR Filter Building were recommended for remediation due to potential as a source of hexavalent chromium groundwater contamination. The former 183-DR Acid Facility area of the 100-D-77 waste site was recommended for remediation due to potential mercury and lead contamination. The former 152C1-DR Substation area of the 100-D-77 waste site was recommended for remediation due to potential polychlorinated biphenyl (PCB) contamination. Other portions of the site, including the former 183-DR Flocculation Basins, 183-DR Sedimentation Basins, and the 183-DR Filter Building, with the exception of the sample room, were not recommended for remediation.

The 100-D-83:1 pipelines were identified as a candidate site for confirmatory sampling in the 100 Area ESD (EPA 2009). The 100-D-83:1 subsite was recommended for remediation due to historical and process information (WCH 2010).

REMEDIAL ACTION SUMMARY

Remedial action at the 100-D-62 waste site was conducted on May 2 and 3, 2011. A reinforced concrete septic tank, associated concrete piping, and soil were removed as part of the remediation and staged at the SPAs. Approximately 793 bank cubic meters (BCM) (1,037 bank cubic yards [BCY]) of soil and debris was loaded on July 12 and 13, 2011, for disposal at the Environmental Restoration Disposal Facility (ERDF).

Remedial action at the 100-D-77 waste site began on May 3, 2011, and continued through July 13, 2011. The 100-D-83:1 subsite, which consisted of the pipeline segments associated with the 183-DR Acid Facility, was removed during the 100-D-77 waste site remediation.

The pipeline segments included low-pressure steam, sulfuric acid, and lime slurry. Remediation continued to approximately 4.5 m (15 ft) below ground surface (bgs) resulting in approximately 7,103 BCM (9,290 BCY) of contaminated soil and debris that was removed and staged at the staging pile areas (SPAs) pending loadout and disposal.

A 20-m (65.6-ft) section of the 100-D-56:2 pipelines, located at the pipelines entrance into the 183-DR Head House, was removed during the 100-D-77 remediation. The 100-D-56:2 subsite consisted of the chemical supply lines (sodium dichromate and sodium silicate) that exited the west side of the 185-D Building and extended to the 183-DR Head House. The former 183-DR Filter Building sample room (Figure 6) was also remediated. Post-excavation civil surveys of the 100-D-62, 100-D-77, and 100-D-83:1 remediation and the 100-D-77 sample room remediation are provided in Figures 7 and 8. Loadout of waste material with subsequent disposal at ERDF was conducted between July 13 and October 18, 2011.

At the completion of the remediation, in-process soil samples were collected on July 6 and July 11, 2011, to determine if additional remediation of the waste site was necessary. The in-process sample data are provided in Appendix B. Mercury was measured above the direct exposure remedial action goals (RAGs) in the in-process sample data. Based on these results, a second tier of excavation was designed.

The tier 2 remediation began on December 8, 2011, and continued through January 16, 2012. Approximately 7,126 BCM (9,320 BCY) of contaminated soil and debris were removed from the excavation and moved to the SPAs for loadout and disposal at ERDF. The excavation depth extended as deep as 9.5 m (31 ft) bgs. An aerial photograph of the excavation area is presented in Figure 9. The final post-excavation civil survey overlaid on the 100-D-77, 100-D-62, and 100-D-83:1 waste sites is shown in Figure 10. Loadout of the tier 2 waste material began on December 14, 2011.

Verification samples of the excavated area were collected on September 18, 2012. Mercury above direct exposure RAGs was measured at one of the sample locations (EXC-4). Benzo(a)pyrene was measured above direct exposure RAGs at two locations (EXC-3 and FS-1) (Figure 11). The presence of elevated PAH within the excavation area was attributed to cross-contamination of asphalt (Figure 12). In agreement with the Washington State Department of Ecology (Ecology) (WCH 2012b), additional soil was removed at and around the sample location (EXC-4) with elevated mercury on March 15, 2013. An additional 76 BCM (100 BCY) of contaminated soil and debris were removed from the excavation and staged prior to disposal at ERDF. The area in which additional removal was performed included the FS-1 sample location. Replacement verification samples were collected at the EXC-4 and FS-1 locations on March 15, 2013. The agreement for additional remediation dispositioned the benzo(a)pyrene result at location EXC-3 as cross-contamination with asphalt (WCH 2012b).

Figure 7. Post-Excavation Civil Survey of the 100-D-62, 100-D-83:1, and 100-D-77 Tier 1 Remediation.

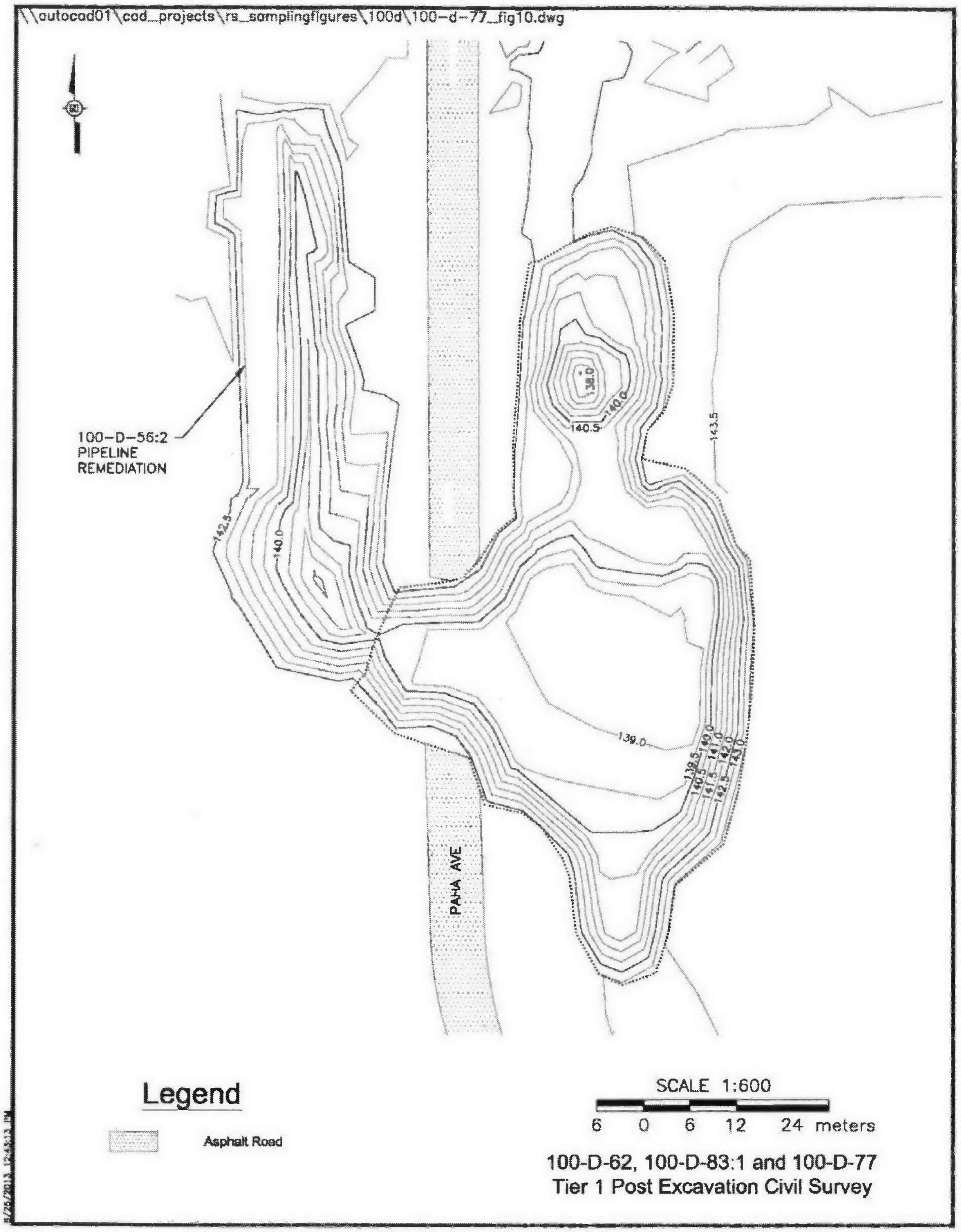


Figure 8. Post-Excavation Civil Survey of the 183-DR Sample Room Remediation.

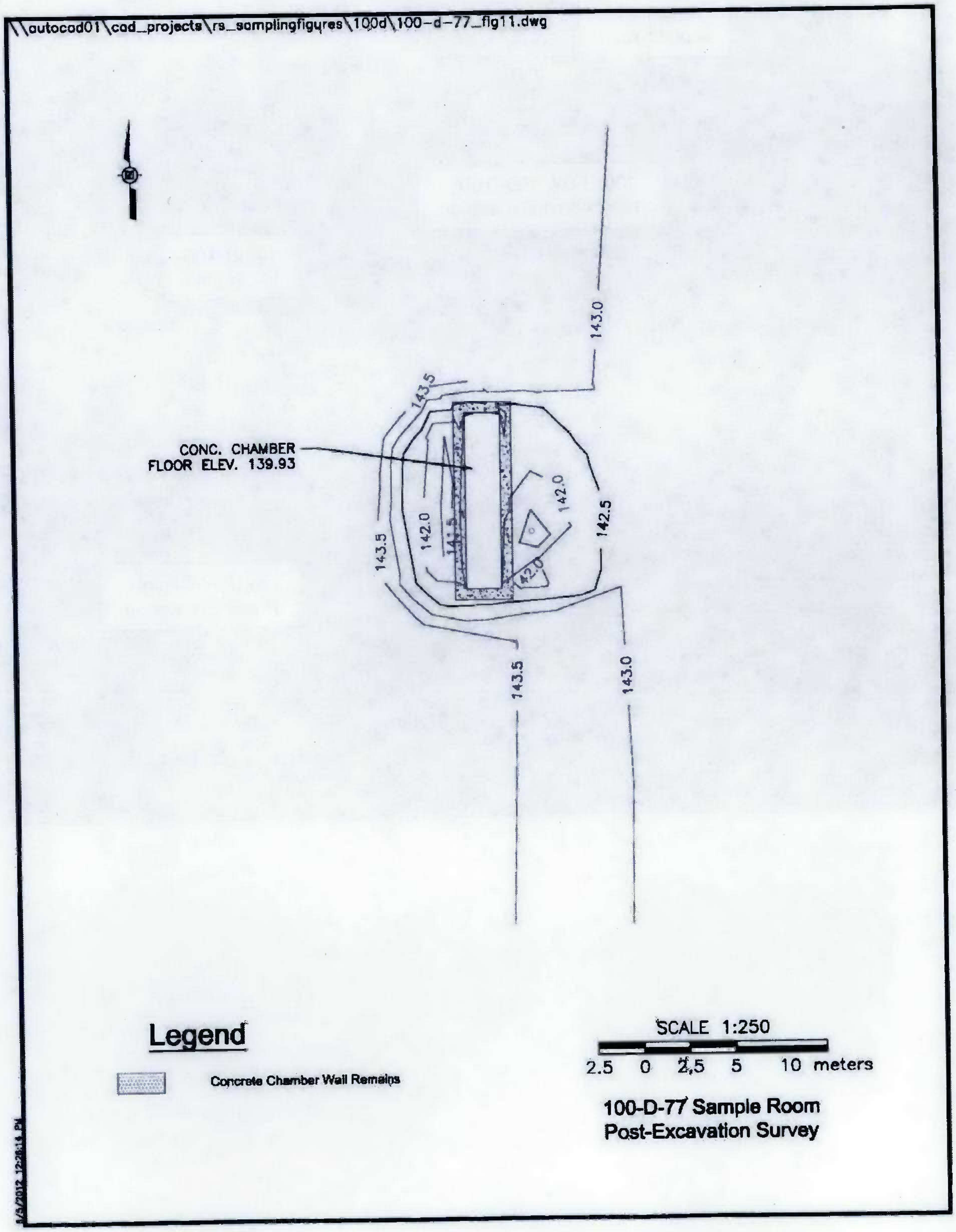


Figure 9. May 2012 Aerial Photograph After Completion of Tier 2 Remediation.

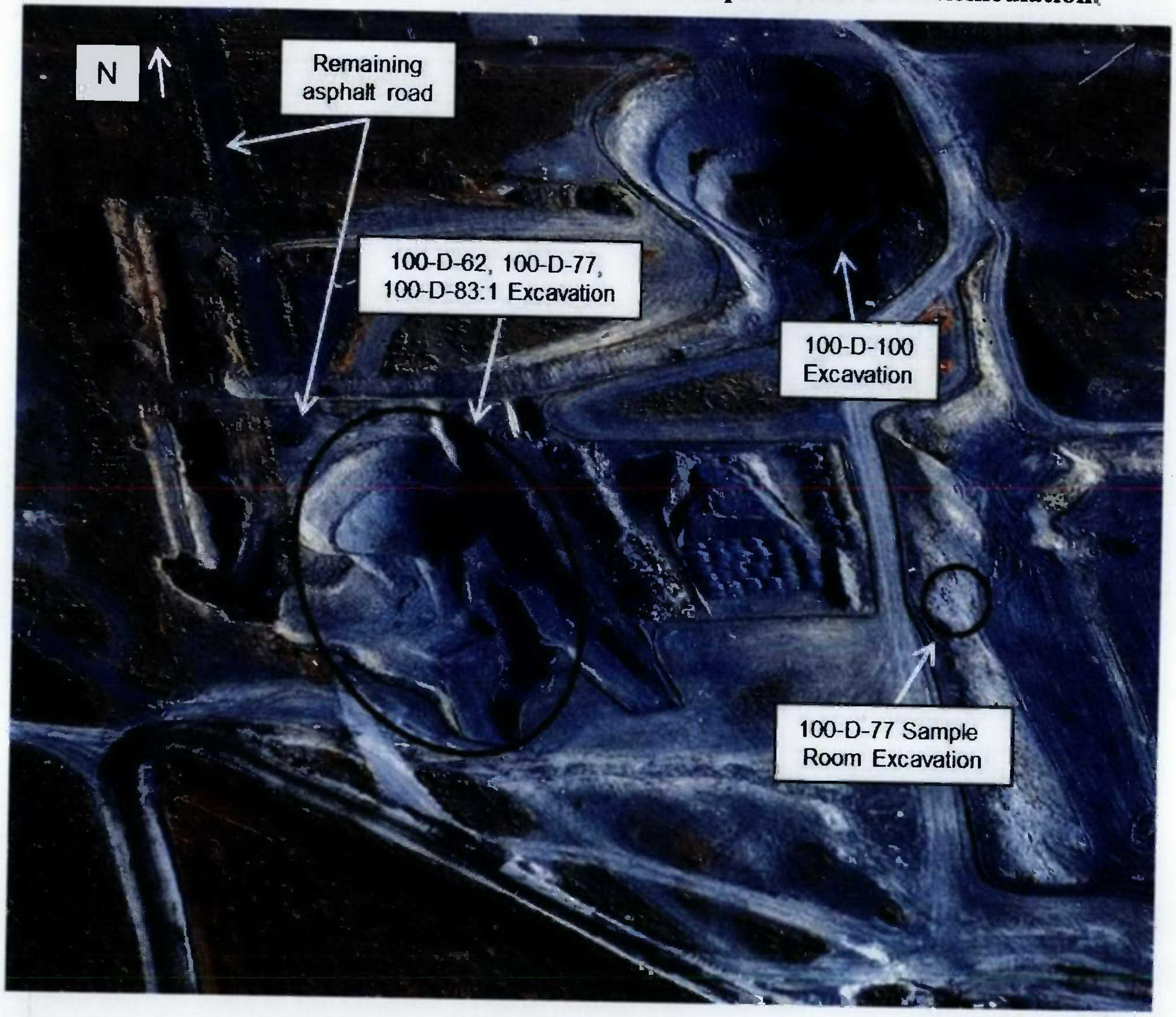


Figure 10. Post-Excavation Civil Survey of the Tier 2 Remediation.

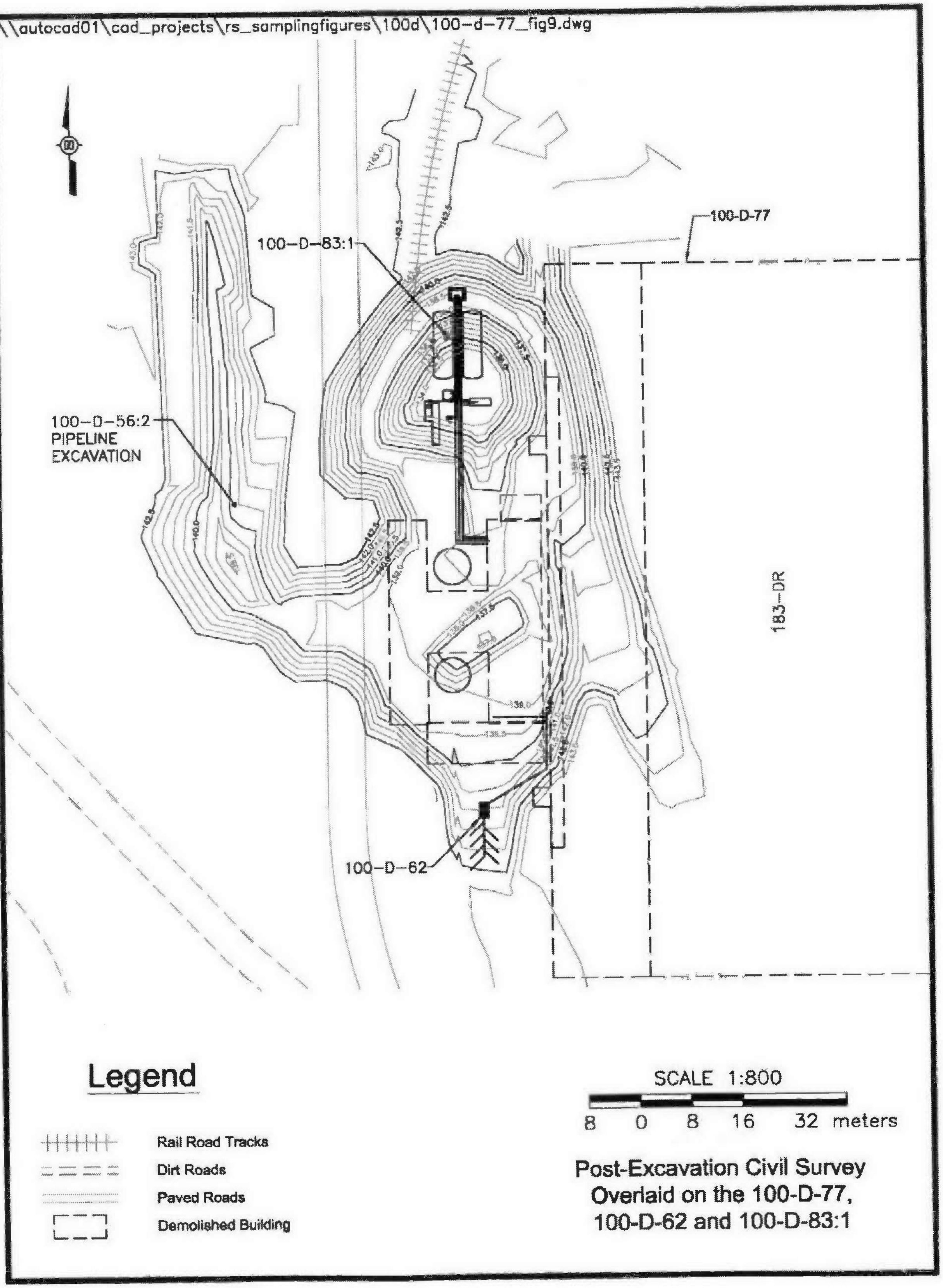
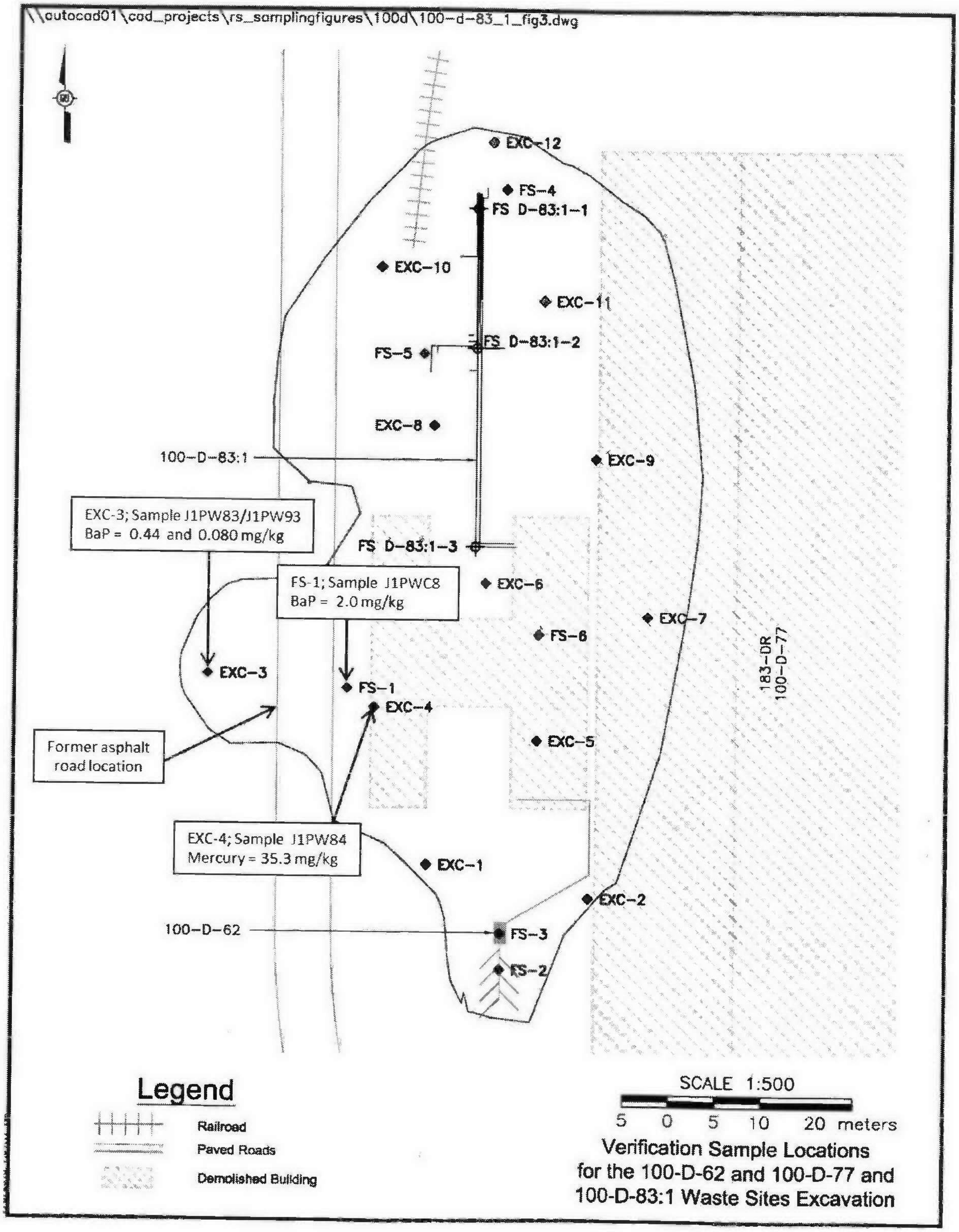


Figure 11. Verification Sample Locations at Tier II Excavation with Direct Exposure Exceedances, Overlain with 100-D-62, 100-D-77, and 100-D-83:1 Site Locations.



BaP = benzo(a)pyrene
DE = direct exposure
RAG = remedial action goal

Figure 12. Asphalt at the EXC-3 Sample Location.

Contaminated soil, concrete, and rebar from previously demolished buildings, piping, and a brick-lined concrete acid trap were among the types of material removed from the excavation. Additionally, two fire extinguishers were found in the SPAs (North SPA 1 and North SPA 2) during waste loadout. Both were found to be discharged and were subsequently disposed. Six focused sample locations were identified for verification sampling based on anomalous material observed during remediation. The focused sample locations, descriptions of material observed, and sample numbers for the waste characterization or in-process samples collected during site remediation are included in Table 1 with data presented in Appendix B.

All materials removed from the 100-D-62, 100-D-77, and 100-D-83:1 excavation were staged at five SPAs prior to loadout and disposal at ERDF. The SPAs identified as North SPA 1, North SPA 2, and North SPA 3 included waste material from the 100-D-62, 100-D-77, and 100-D-83:1 remediation only. The two other SPAs (4 and 5) received waste material from 100-D-62, 100-D-77, and 100-D-83:1 remediation, as well as the 100-D-50:6, 183-DR Clearwell Drain Pipelines, and 100-D-104, Unplanned Release Near 185-D Sodium Dichromate Storage Tank and Acid Neutralization French Drain waste sites. SPAs 4 and 5 were still in use when the 100-D-62, 100-D-77, and 100-D-83:1 waste sites VWI was prepared. Therefore, only SPAs 1, 2, and 3 were included in the VWI (WCH 2013e). Verification sampling and evaluation for SPAs 4 and 5 were conducted with the 100-D-50:6 waste site (WCH 2012c, 2013d).

VERIFICATION SAMPLING ACTIVITIES

This section describes the basis for selection of a verification sampling design for the 100-D-62, 100-D-77, and 100-D-83:1 waste sites excavation area and SPAs. Two decision units (excavation area and SPA) were identified for the purpose of statistical verification sampling. Six focused sample locations were identified based on anomalous material observed during remediation, as described in Table 1. A seventh focused sample was located at the remediated location of the 183-DR Filter Building sample room. Three additional focused samples were located in the footprint of the former 100-D-83:1 pipelines.

Verification sampling was conducted on September 4 and 18, 2012; March 15, 2013; April 8 and 29, 2013; and May 29, 2013. Sampling and analysis were performed to support a determination that residual contaminant concentrations in the soil meet cleanup criteria specified in the RDR/RAWP (DOE-RL 2009b) and the Remaining Sites ROD (EPA 1999). Grab samples were collected as described in the *Work Instruction for Verification Sampling of the 100-D-77, 183-DR Water Treatment Facility;100-D-62, 183-DR Headhouse Septic Tank; and 100-D-83:1, 183-DR Acid Addition Pipelines Waste Sites* (WCH 2013e). An additional verification focused sample for 100-D-77 was collected from the former 183-DR Filter Building sample room location remediation. This sample was included in the *Work Instruction for Verification Sampling of the 100-D-50:6, 183-DR Clearwell Drain Pipelines Waste Site* (WCH 2012c). This sample location was identified as "FS-5 (100-D-77)" in the 100-D-50:6 verification work instruction (WCH 2012c). All sampling was performed in accordance with ENV-1, *Environmental Monitoring & Management*, to fulfill the requirements of the *100 Area Remedial Action Sampling and Analysis Plan* (DOE-RL 2009a).

Table 1. Waste Characterization/In-Process Sample Locations Identified for Focused Sampling of Anomalous Material in the Verification Work Instruction (WCH 2013e).

HEIS Sample Number	Sample Type	Washington State Plane (m)		Location Description	Focused Sample Location
		Northing	Easting		
J1H216	Waste characterization, soil	151185	573239	100-D-77, red/rust to light brown colored soil from chemical transfer area	FS-1
J1H217	Waste characterization, soil	151154	573256	100-D-62, soil from drain field	FS-2
J1H230	Waste characterization, sludge	151158	573256	100-D-62, tank contents, dark black/brown sludge-like material with strong sewer odor	FS-3
J1J4W7	In-process, other solid	151240	573256	100-D-77, salmon-colored material from acid trap with a putty-like consistency and very finely grained	FS-4
J1K4H9	In-process, soil	151222	573247	100-D-77, coarse sand matrix with a bleached/white appearance, small crystalline pieces visible in soil matrix	FS-5
J1K4D6	In-process, soil	151191.2	573260.1	100-D-62/100-D-77, Location #6 at base of excavation	FS-6

HEIS = Hanford Environmental Information System

Contaminants of Potential Concern for Verification Sampling

The COPCs for the 100-D-62 and 100-D-77 waste sites were determined based on available historical information for the 183-DR Water Treatment Facility and contaminants associated with septic systems. The COPCs for the 100-D-62 septic system consisted of chemicals used in the 183-DR Head House and included hexavalent chromium, total chromium, lead, mercury, and anions. Semivolatile organic compounds (SVOCs), PAH, pesticides, and PCBs were also considered COPCs for 100-D-62 based on findings from other septic systems in the 100-D Area. The COPCs for the 100-D-77 water treatment facility included hexavalent chromium, total chromium, lead, mercury, and sulfate. Nitrate was included because of nitrate contamination in the 100-D Area groundwater. Petroleum hydrocarbons were included as COPCs because of the proximity of the former 152C1-DR substation.

A combined list of COPCs for verification sampling of the excavation area and SPAs included hexavalent chromium, total chromium, lead mercury, anions, SVOCs, PAH, pesticides, PCBs, and petroleum hydrocarbons. While not considered COPCs, antimony, arsenic, barium, beryllium, boron, cadmium, cobalt, copper, manganese, molybdenum, nickel, selenium, silver, vanadium, and zinc were evaluated with the expanded inductively coupled plasma (ICP) metals list.

The 100-D-83:1 pipelines transported low-pressure steam, sulfuric acid, and lime slurry. The COPCs identified for the pipelines were identical to those for the 100-D-77 waste site and included hexavalent chromium (due to hexavalent chromium contamination at 100-D Area), total chromium, lead, mercury, and sulfate. Nitrate was also included because of the nitrate contamination in the groundwater in the 100-D Area. These COPCs were included for 100-D-83:1 focused samples.

The analytical methods that were performed to evaluate the 100-D-62, 100-D-77, and 100-D-83:1 site COPCs are provided in Table 2.

Table 2. Laboratory Analytical Methods. (2 Pages)

Analytical Method	Contaminants of Potential Concern
ICP metals – EPA Method 6010 [a]	Chromium (total), lead
Mercury – EPA Method 7471	Mercury
Hexavalent chromium – EPA Method 7196	Hexavalent chromium
IC Anions – EPA Method 300.0	Sulfate
Nitrate/nitrite – EPA Method 353.2	Nitrate
SVOA – EPA Method 8270	Semivolatile organic compounds
PAH – EPA Method 8310 [b]	Polycyclic aromatic hydrocarbons
Pesticides – EPA Method 8081	Pesticides
PCB – EPA Method 8082	Polychlorinated biphenyls

Table 2. Laboratory Analytical Methods. (2 Pages)

Analytical Method	Contaminants of Potential Concern
TPH – EPA Method NWTPH-Dx	Total petroleum hydrocarbons

[a] The expanded list of ICP metals included antimony, arsenic, barium, beryllium, boron, cadmium, chromium (total), cobalt, copper, lead, manganese, molybdenum, nickel, selenium, silver, vanadium, and zinc in the analytical results package.

[b] Because method 8310 specifically analyzes for PAH, data from this method was used preferentially over method 8270 data for site evaluation of the PAH analytes.

EPA = U.S. Environmental Protection Agency
IC = ion chromatography
ICP = inductively coupled plasma
NWTPH = Northwest total petroleum hydrocarbons
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyl
SVOA = semivolatile organic analysis
TPH = total petroleum hydrocarbons

Verification Sampling Design

The statistical sampling designs for the 100-D-62, 100-D-77, and 100-D-83:1 remediation were developed using Visual Sample Plan[1] (VSP). The areas identified for the purpose of statistical verification sampling were delineated in VSP and used as the basis for a random-start systematic grid for verification soil sample collection at the site. Twelve statistical soil samples were collected on the grid within each of the two decision units. A triangular grid is used based on studies that indicate triangular grids are superior to square grids (Gilbert 1987). Six focused sample locations were identified within the excavation area based on anomalous material observed during remediation. The focused sample locations, descriptions of material observed, and sample numbers for the waste characterization or in-process samples collected during site remediation are presented in Table 1. The verification sample locations are presented in Figures 13 and 14.

A remediated portion of the 100-D-77 waste site, the location of the former 183-DR Filter Building sample room, was inadvertently omitted from the VWI (WCH 2013e). A verification focused sample for this location was included in the verification sample design for the 100-D-50:6, 183-DR Clearwell Drain Pipelines waste site (WCH 2012c). This sample location was identified as "FS-5 (100-D-77)" in the 100-D-50:6 VWI (WCH 2012c). Sample location "FS-5 (100-D-77)" is not related to sample location "FS-5" collected under the 100-D-77 VWI (WCH 2013e).

Because of a change in the original boundary for North SPA 3, five verification samples, all within the North SPA 3 boundary, required relocation and the sample design was revised (Rev. 1) (WCH 2013e). After the date of the initial SPA approval and prior to placement of waste material in the North SPA 3 area, a haul road was constructed across the eastern portion of the SPA, reducing its usable area (Figure 15).

[1] Visual Sample Plan is a site map-based user-interface program that may be downloaded at http://vsp.pnnl.gov.

Figure 13. Verification Sample Locations for the 100-D-62, 100-D-77, and 100-D-83:1 Waste Sites Excavation Decision Unit.

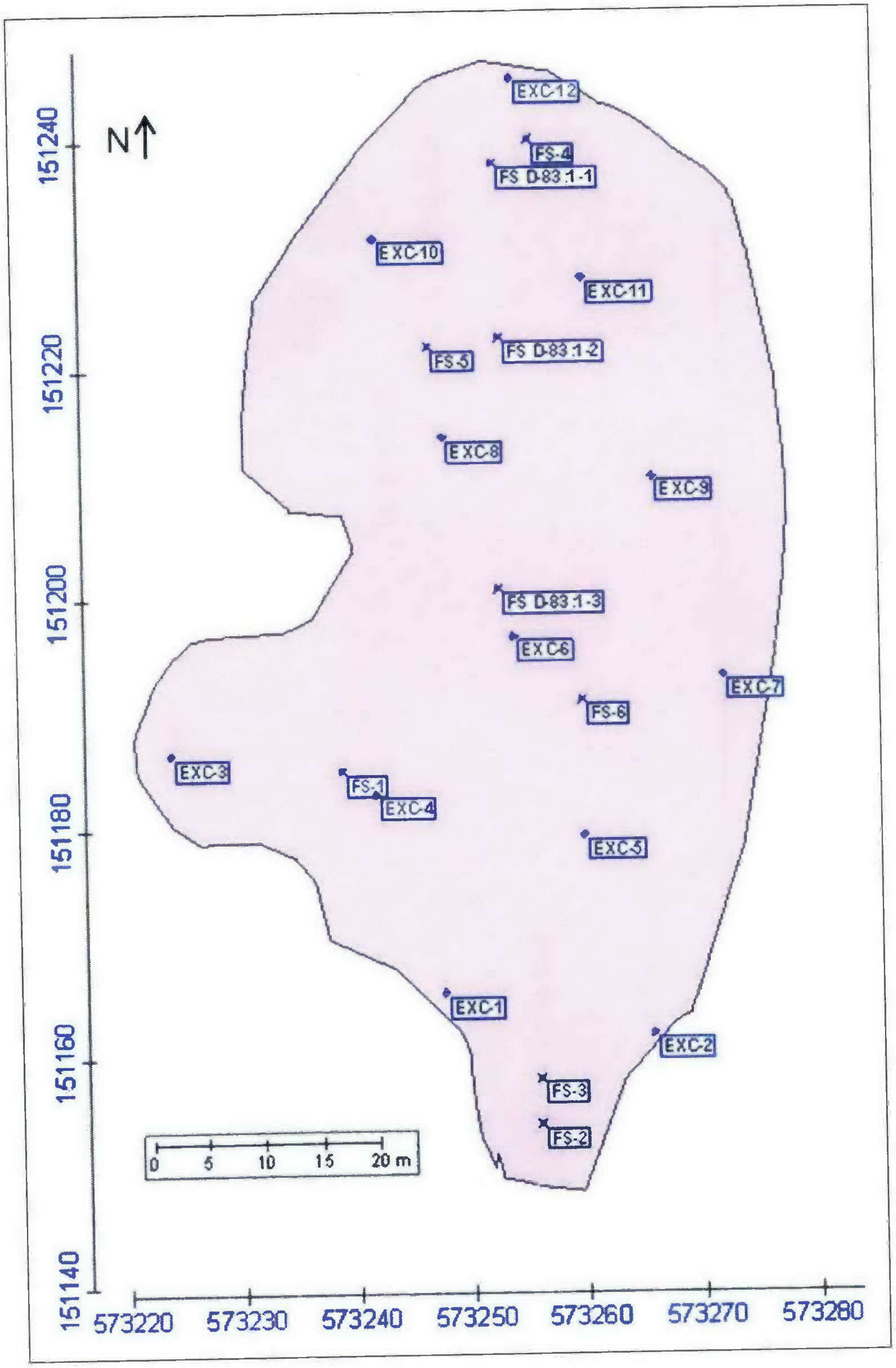


Figure 14. Verification Sample Locations for the 100-D-62, 100-D-77, and 100-D-83:1 Staging Pile Area Decision Unit.

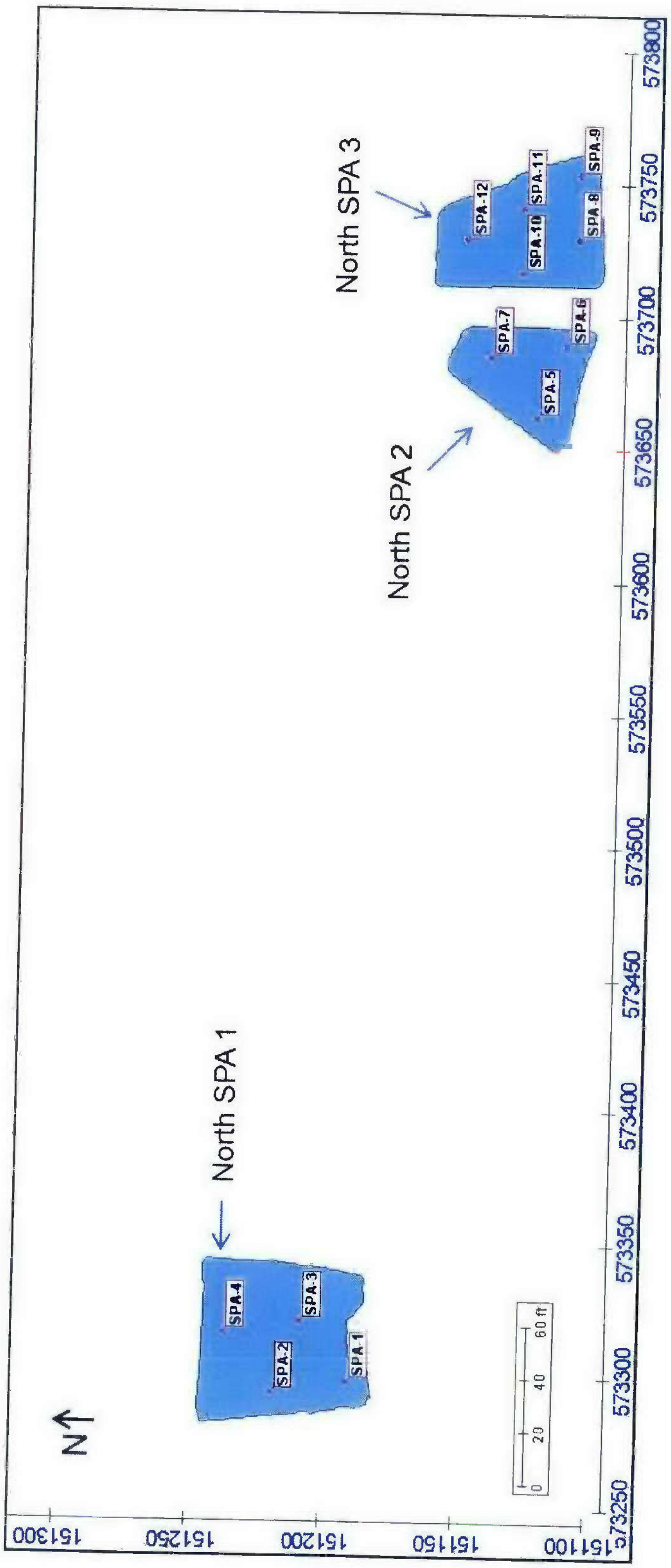
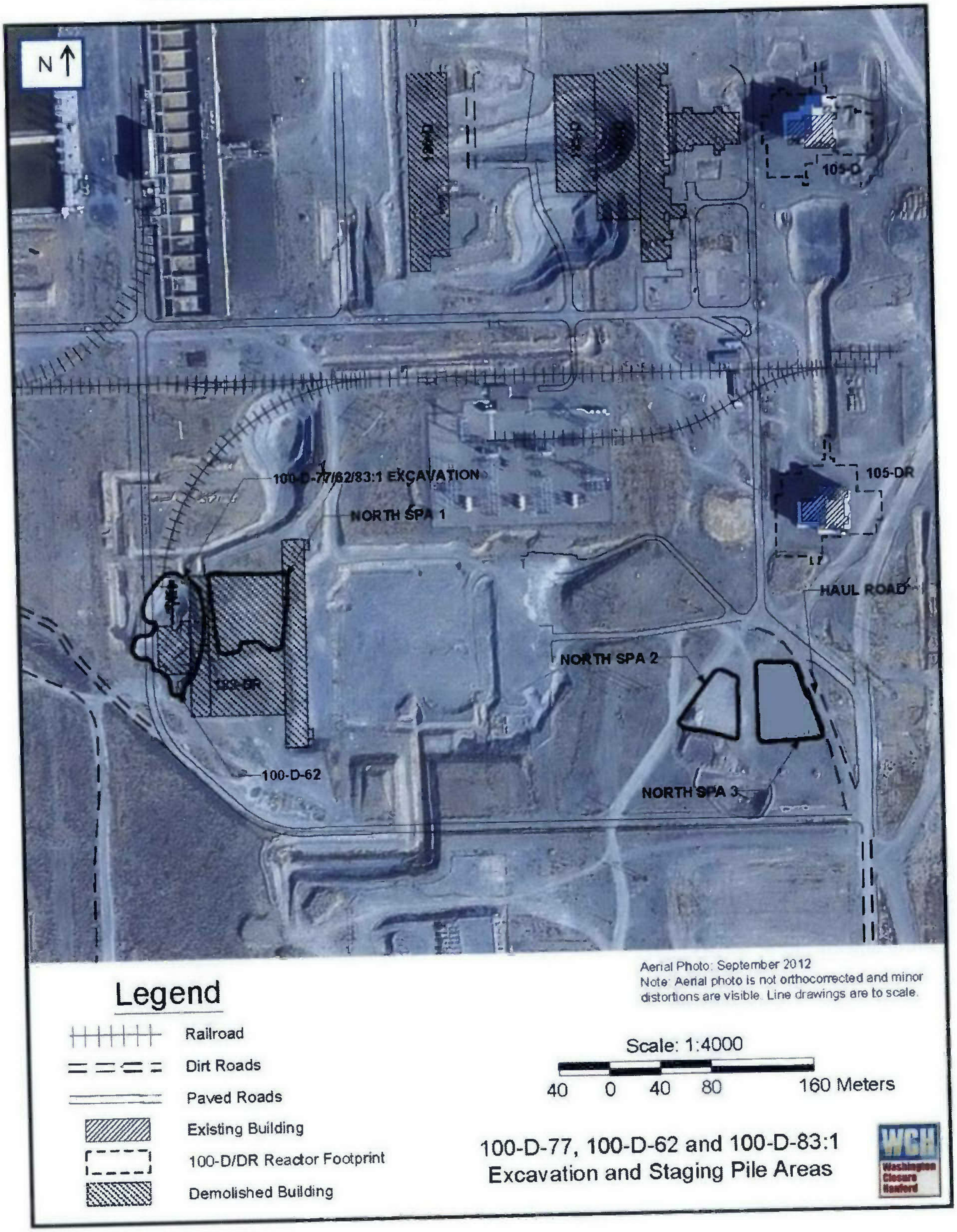


Figure 15. 100-D-62, 100-D-77, and 100-D-83:1 Excavation and Staging Pile Area Locations Overlain on a September 2012 Aerial Photograph.



The boundary for the North SPA 3 area used to create the Rev. 0 sample design inadvertently included the entire approved SPA boundary rather than the actual area utilized for staging waste. This resulted in three sample locations falling outside of the actual waste staging area. The North SPA 3 was surveyed, and the resulting shape (as shown in Figures 14 and 15) was entered into VSP to determine new sample locations for SPA-8, SPA-9, SPA-10, SPA-11, and SPA-12. The locations for these five samples within the updated boundary were generated by VSP using systematic grid sampling and a triangular grid, which was the same method used for the statistical sample placement in the Rev. 0 sample design. The Rev. 0 sample locations for SPA-8, SPA-9, SPA-10, SPA-11, and SPA-12, were replaced in Rev. 1 with the new locations.

Three additional focused samples were added in Rev. 2 of the sample design (WCH 2013c) to specifically address the remediation of 100-D-83:1 pipelines. The waste site was fully removed within the 100-D-77 excavation (Figure 10). The additional verification samples were located in the footprint of the 100-D-83:1 waste site as described below:

1. FS-D-83:1-1 was located at the former location of the acid storage tanks.
2. FS-D-83:1-2 was located at the intersection of the pipelines from the former acid head tank and the pipelines between the acid storage tank and the 183-DR Head House.
3. FS-D-83:1-3 was located downstream of the acid tanks at the location of a 90 degree bend in the pipelines, prior to entry into the 183-DR Head House.

A summary of the verification samples collected and laboratory analyses performed is provided in Table 3.

Table 3. 100-D-62, 100-D-77, and 100-D-83:1 Verification Sample Summary. (2 Pages)

Sample Location	HEIS Sample Number	Washington State Plane Coordinates (m)		Sample Analysis
		Northing	Easting	
EXC-1	J1PW81	151165.5	573247.8	ICP metals [b], mercury, hexavalent chromium, IC anions, nitrate/nitrite, SVOA, pesticides, PAH, PCBs, TPH
EXC-2	J1PW82	151161.9	573265.7	
EXC-3	J1PW83	151186.5	573223.9	
EXC-4 [a]	J1PW84	151182.9	573241.9	
EXC-4 (resample)	J1RJ77	151182.9	573241.9	
EXC-5	J1PW85	151179.3	573259.9	
EXC-6	J1PW86	151196.7	573254.0	
EXC-7	J1PW87	151193.1	573272.0	
EXC-8	J1PW88	151214.1	573248.2	
EXC-9	J1PW89	151210.4	573266.2	
EXC-10	J1PW90	151231.4	573242.3	
EXC-11	J1PW91	151227.8	573260.3	
EXC-12	J1PW92	151245.2	573254.5	
Duplicate of J1PW83	J1PW93	151186.5	573223.9	
Split of J1PW83	J1PWF8	151186.5	573223.9	

Table 3. 100-D-62, 100-D-77, and 100-D-83:1 Verification Sample Summary. (2 Pages)

Sample Location	HEIS Sample Number	Washington State Plane Coordinates (m)		Sample Analysis
		Northing	Easting	
SPA-1	J1R641	151190.4	573297.6	ICP metals [b], mercury, hexavalent chromium, IC anions, nitrate/nitrite, SVOA, pesticides, PAH, PCBs, TPH
SPA-2	J1R642	151219.1	573293.4	
SPA-3	J1R643	151208.4	573320.3	
SPA-4	J1R644	151237.1	573316.2	
SPA-5	J1R645	151125.8	573662.1	
SPA-6	J1R646	151115.0	573689.0	
SPA-7	J1R647	151143.7	573684.9	
SPA-8 [c]	J1RKM8	151110.9	573728.9	
SPA-9 [c]	J1RKM9	151110.9	573753.1	
SPA-10 [c]	J1RKM6	151132.0	573716.7	
SPA-11 [c]	J1RKM7	151132.0	573741.0	
SPA-12 [c]	J1RKM5	151153.0	573728.9	
Duplicate of J1R645	J1R653	151125.8	573662.1	
Split of J1R645	J1R670	151125.8	573662.1	
FS-1 [d, e]	J1PWC8	151185.0	573239.0	ICP metals [b], mercury, hexavalent chromium, IC anions, nitrate/nitrite, SVOA, pesticides, PAH, PCBs, TPH
FS-1 [e] (resample)	J1RJ78	151185.0	573239.0	
FS-2 [e]	J1PWC9	151154.0	573256.0	
FS-3 [e]	J1PWD0	151158.0	573256.0	
FS-4 [e]	J1PWD1	151240.0	573256.0	
FS-5 [e]	J1PWD2	151222.0	573247.0	
FS-6 [e]	J1PWD3	151191.0	573260.0	
FS D-83:1-1 [f]	J1RN38	151237.9	573252.8	ICP metals [b], mercury, hexavalent chromium, IC anions, nitrate/nitrite
FS D-83:1-2 [f]	J1RN39	151222.7	573253.2	
FS D-83:1-3 [f]	J1RN40	151200.7	573252.8	
FS-5 (100-D-77) [g]	J1R160	151188.0	573356.5	ICP metals [b], mercury, hexavalent chromium, IC anions, nitrate/nitrite, TPH
Equipment blank	J1R654	NA	NA	ICP metals [b], mercury, SVOA

[a] Mercury above direct exposure RAGs was measured in J1PW84 at sample location EXC-4. This location and surrounding area, including the FS-1 location, underwent additional remediation and was resampled for all analyses.
[b] The expanded list of ICP metals included antimony, arsenic, barium, beryllium, boron, cadmium, chromium (total), cobalt, copper, lead, manganese, molybdenum, nickel, selenium, silver, vanadium, and zinc.
[c] New sample locations for the five North SPA 3 samples SPA-8, SPA-9, SPA-10, SPA-11, and SPA-12 were included in Rev. 1 of the verification work instruction (WCH 2013e).
[d] Benzo(a)pyrene above direct exposure RAGs was measured in J1PWC8 at sample location FS-1 due to asphalt cross-contamination. Sample location FS-1 was within the area that underwent additional remediation due to mercury contamination at location EXC-4. After the additional removal action, location FS-1 and EXC-4 were both resampled for all analyses.
[e] Six focused samples associated with the 100-D-62 and 100-D-77 waste sites were identified for verification sampling based on in-process sample results as detailed in Table 1.
[f] Focused samples FS-D-83:1-1, FS-D-83:1-2, and FS-D-83:1-3 were located in the footprint of the 100-D-83:1 waste site and added in Rev. 2 of the verification work instruction (WCH 2012e).
[g] Sample location FS-5 (100-D-77) was identified in the 100-D-50:6 verification work instruction (WCH 2012c) as a 100-D-77 verification sample located at the former 183-DR Filter Building sample room.

HEIS = Hanford Environmental Information System
IC = ion chromatography
ICP = inductively coupled plasma
NA = not applicable
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyl
SPA = staging pile area
SVOA = semivolatile organic analysis
TPH = total petroleum hydrocarbons

Verification Sampling Results

All verification samples were analyzed using analytical methods approved by EPA (DOE-RL 2009b). Evaluation of the verification data from the 100-D-62, 100-D-77, and 100-D-83:1 waste sites was performed by direct comparison of the statistical or maximum sample results for each COPC against cleanup criteria.

The primary statistical calculation to evaluate compliance with cleanup standards is the 95% upper confidence limit (UCL) on the arithmetic mean of the data. The 95% UCL values for each detected COPC are computed for each of the decision units as specified by the RDR/RAWP (DOE-RL 2009b). The calculations are provided in Appendix C. When a nonradionuclide COPC was detected in fewer than 50% of the verification samples collected for a decision unit, the maximum detected value was used for comparison to RAGs. If no detections for a given COPC were reported in the data set, then no statistical calculation or evaluation was performed for that COPC.

Comparisons of the results for site COPCs with the RAGs for each of the decision units are listed in Tables 4, 5, and 6. Contaminants that were not detected by laboratory analysis are excluded from these tables. Calculated cleanup levels are not presented in the Cleanup Levels and Risk Calculations Database (Ecology 2012) under WAC 173-340-740(3) for calcium, magnesium, potassium, silicon, and sodium. The EPA's *Risk Assessment Guidance for Superfund* (EPA 1989) recommends that aluminum and iron not be considered in site risk evaluations. Therefore, aluminum, calcium, iron, magnesium, potassium, silicon, and sodium are not considered site COPCs and are also not included in these tables. The complete laboratory results are stored in the Environmental Restoration (ENRE) project-specific database prior to submitting to the Hanford Environmental Information System (HEIS) for archiving and are provided in Appendix C.

As previously discussed, elevated concentrations of multiple PAH, including benzo(a)pyrene above the direct exposure RAG, were reported in verification samples from locations EXC-3 and FS-1 (Figure 11). Also, mercury was detected above the direct exposure RAG in statistical sample EXC-4 (J1PW84) and required additional remediation (Figure 11). In agreement with Ecology, additional removal occurred at the EXC-4 location and surrounding area (WCH 2012b). Because the area of additional soil removal included the FS-1 location, verification samples for all analyses were collected from both the EXC-4 and FS-1 locations. The benzo(a)pyrene above the direct exposure RAG from the EXC-3 location is the result of asphalt cross-contamination (WCH 2012b). Therefore, the benzo(a)pyrene results for sample J1PW83 and duplicate J1PW93 are presented for information only and not evaluated for cleanup verification.

Table 4. Comparison of Contaminant Concentrations to Action Levels for the 100-D-62, 100-D-77, and 100-D-83:1 Excavation Area Decision Unit Verification Statistical Samples. (2 Pages)

COPC	Statistical or Maximum Result [b] (mg/kg)	Remedial Action Goals (mg/kg) [a]			Does the Result Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Antimony [c]	0.40 (<BG)	32	5 [d]	5 [d]	No	--
Arsenic	2.9 (<BG)	20 [d]	20 [d]	20 [d]	No	--
Barium	66.0 (<BG)	5,600	200	400	No	--
Beryllium	0.37 (<BG)	10.4 [e]	1.51 [d]	1.51 [d]	No	--
Boron [f]	1.3	7,200	320	-- [g]	No	--
Cadmium [c]	0.062 (<BG)	13.9 [e]	0.81 [d]	0.81 [d]	No	--
Chromium	9.1 (<BG)	80,000	18.5 [d]	18.5 [d]	No	--
Cobalt	10.0 (<BG)	24	15.7 [d]	-- [g]	No	--
Copper	16.2 (<BG)	2,960	59.2	22.0 [d]	No	--
Lead	7.8 (<BG)	353	10.2 [d]	10.2 [d]	No	--
Manganese	331 (<BG)	3,760	512 [d]	512 [d]	No	--
Mercury	0.12 (<BG)	24	0.33 [d]	0.33 [d]	No	--
Molybdenum [f]	0.43	400	8	-- [g]	No	--
Nickel	13.2 (<BG)	1,600	19.1 [d]	27.4	No	--
Vanadium	75.5 (<BG)	560	85.1 [d]	-- [g]	No	--
Zinc	50.3 (<BG)	24,000	480	67.8 [d]	No	--
Chloride	4.8 (<BG)	--	25,000	-- [g]	No	--
Fluoride	0.92 (<BG)	4,800	96	400	No	--
Nitrogen in nitrate	1.2 (<BG)	128,000	1,000	2,000	No	--
Nitrogen in nitrite and nitrate	2.9 (<BG)	128,000	1,000	2,000	No	--
Sulfate	29.0 (<BG)	NA	25,000	-- [g]	No	--
TPH (diesel range)	7.9	200	200	200	No	--
TPH (diesel range extended)	18.1	200	200	200	No	--
2-Methylnaphthalene	0.12	320	3.2	-- [g]	No	--
Acenaphthene	0.19	4,800	96	129	No	--
Acenaphthylene [j]	0.013	4,800	96	129	No	--
Anthracene	0.39	24,000	240	1,920	No	--
Benzo(a)anthracene	0.66	1.37	0.015 [h]	0.015 [h]	Yes	Yes [i]
Benzo(a)pyrene	0.023	0.137	0.015 [h]	0.015 [h]	Yes	Yes [i]
Benzo(b)fluoranthene	0.50	1.37	0.015 [h]	0.015 [h]	Yes	Yes [i]
Benzo(ghi)perylene [j]	0.32	2,400	48	192	No	--
Benzo(k)fluoranthene	0.18	1.37	0.015 [h]	0.015 [h]	Yes	Yes [i]
Carbazole	0.57	50	0.438	-- [g]	-- [k]	-- [k]
Chrysene	0.56	13.7	0.12	0.1 [h]	Yes	Yes [i]
Dibenz(a,h)anthracene	0.092	1.37	0.03 [h]	0.03 [h]	Yes	Yes [i]
Dibenzofuran	0.34	160	3.20	-- [g]	No	--

Table 4. Comparison of Contaminant Concentrations to Action Levels for the 100-D-62, 100-D-77, and 100-D-83:1 Excavation Area Decision Unit Verification Statistical Samples. (2 Pages)

COPC	Statistical or Maximum Result [b] (mg/kg)	Remedial Action Goals (mg/kg) [a]			Does the Result Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Fluoranthene	1.2	3,200	64	18.0	No	--
Fluorene	0.25	3,200	64	260	No	--
Indeno(1,2,3-cd)pyrene	0.30	1.37	0.33 [h]	0.33 [h]	Yes	Yes [i]
Phenanthrene [j]	1.2	24,000	240	1,920	No	--
Pyrene	1.3	2,400	48	192	No	--
Aroclor-1260	0.0075	0.5	0.017 [h]	0.017 [h]	No	--

[a] RAGs obtained from the 100 Area RDR/RAWP (DOE-RL 2009b).
[b] Maximum or 95% UCL, depending on data censorship, as described in the *100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Cleanup Verification 95% UCL Calculations* (Appendix C).
[c] Hanford Site-specific background value is not available; it was not evaluated during background study. Value used is from *Natural Background Soil Metals Concentrations in Washington State* (Ecology 1994).
[d] Where cleanup levels are less than background, cleanup levels default to background per WAC 173-340-700(4)(d) (Ecology 1996). The arsenic cleanup level of 20 mg/kg has been agreed to by the Tri-Party Agreement project managers as discussed in Section 2.1.2.1 of the 100 Area RDR/RAWP (DOE-RL 2009b).
[e] Carcinogenic cleanup level calculated based on the inhalation exposure pathway (WAC 173-340-750[3], Ecology 1996) using an airborne particulate mass-loading rate of 0.0001 g/m^3 (*Hanford Guidance for Radiological Cleanup* [WDOH 1997]).
[f] No Hanford Site-specific or Washington State background value available.
[g] No parameters (bioconcentration factors or ambient water quality criteria values) are available from the Washington State Department of Ecology Cleanup Levels and Risk Calculations database or other databases to calculate cleanup levels (WAC 173-340-730[3][a][iii], 1996 [Method B for surface waters]).
[h] Where cleanup levels are less than RDLs, cleanup levels default to RDLs per WAC 173-340-707(2) (Ecology 1996).
[i] Based on RESRAD modeling discussed in Appendix C of the 100 Area RDR/RAWP (DOE-RL 2009b), the residual concentrations of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene are not predicted to migrate vertically within 1,000 years (based on the lowest distribution coefficient of the contaminants exceeding RAGs, chrysene, with a distribution coefficient value of 200 mL/g). The distance to groundwater from the bottom of the excavation area is 16.0 m (52.5 ft). Therefore, residual concentrations of these constituents are predicted to be protective of groundwater and the Columbia River.
[j] Toxicity data for this chemical are not available. Cleanup levels are based on the following surrogate chemicals:
Contaminant: acenaphthylene, surrogate: acenaphthene
Contaminant: benzo(g,h,i)perylene, surrogate: pyrene
Contaminant: phenanthrene, surrogate: anthracene.
[k] Carbazole was detected at the EXC-3 location only and is attributed to cross-contamination of asphalt. Therefore, carbazole is not indicative of residual contamination from the waste sites and is not evaluated against the RAGs.

-- = not applicable
BG = background
COPC = contaminant of potential concern
RAG = remedial action goal
RDL = required detection limit
RDR/RAWP = Remedial Design Report/Remedial Action Work
RESRAD = RESidual RADioactivity (dose model)
TPH = total petroleum hydrocarbons
UCL = upper confidence limit
WAC = *Washington Administrative Code*

Table 5. Comparison of Contaminant Concentrations to Action Levels for the 100-D-62, 100-D-77, and 100-D-83:1 Excavation Area Decision Unit Verification Focused Samples. (2 Pages)

COPC	Maximum Result (mg/kg)	Remedial Action Goals (mg/kg) [a]			Does the Result Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Antimony [b]	1.1 (<BG)	32	5 [c]	5 [c]	No	--
Arsenic	2.5 (<BG)	20 [c]	20 [c]	20 [c]	No	--
Barium	65.9 (<BG)	5,600	200	400	No	--
Beryllium	0.51 (<BG)	10.4 [d]	1.51 [c]	1.51 [c]	No	--
Boron [e]	1.7	7,200	320	-- [f]	No	--
Cadmium [b]	0.18 (<BG)	13.9 [d]	0.81 [c]	0.81 [c]	No	--
Chromium	7.4 (<BG)	80,000	18.5 [c]	18.5 [c]	No	--
Cobalt	11.6 (<BG)	24	15.7 [c]	-- [f]	No	--
Copper	19.4 (<BG)	2,960	59.2	22.0 [c]	No	--
Hexavalent chromium [e]	0.259	2.1 [d]	4.8	2	No	--
Lead	7.8 (<BG)	353	10.2 [c]	10.2 [c]	No	--
Manganese	337 (<BG)	3,760	512 [c]	512 [c]	No	--
Mercury	0.15 (<BG)	24	0.33 [c]	0.33 [c]	No	--
Molybdenum [e]	0.51	400	8	-- [f]	No	--
Nickel	10.8 (<BG)	1,600	19.1 [c]	27.4	No	--
Vanadium	113	560	85.1 [c]	-- [f]	Yes	Yes [g]
Zinc	48.2 (<BG)	24,000	480	67.8 [c]	No	--
Chloride	15.5 (<BG)	--	25,000	-- [f]	No	--
Fluoride	1.4 (<BG)	4,800	96	400	No	--
Nitrogen in nitrate	2.4 (<BG)	128,000	1,000	2,000	No	--
Nitrogen in nitrite and nitrate	1.9 (<BG)	128,000	1,000	2,000	No	--
Sulfate	3,890	NA	25,000	-- [f]	No	--
TPH (diesel range)	16	200	200	200	No	--
TPH (diesel range extended)	24	200	200	200	No	--
Benzo(a)anthracene	0.011	1.37	0.015 [h]	0.015 [h]	No	--
Benzo(a)pyrene	0.016	0.137	0.015 [h]	0.015 [h]	Yes	Yes [g]
Benzo(b)fluoranthene	0.017	1.37	0.015 [h]	0.015 [h]	Yes	Yes [g]
Benzo(k)fluoranthene	0.012	1.37	0.015 [h]	0.015 [h]	No	--
Chrysene	0.018	13.7	0.12	0.1 [h]	No	--
Fluoranthene	0.034	3,200	64	18.0	No	--
Indeno(1,2,3-cd)pyrene	0.014	1.37	0.33 [h]	0.33 [h]	No	--
Pyrene	0.040	2,400	48	192	No	--
Aroclor-1260	0.0034	0.5	0.017 [h]	0.017 [h]	No	--

Table 5. Comparison of Contaminant Concentrations to Action Levels for the 100-D-62, 100-D-77, and 100-D-83:1 Excavation Area Decision Unit Verification Focused Samples. (2 Pages)

COPC	Maximum Result (mg/kg)	Remedial Action Goals (mg/kg) [a]			Does the Result Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Endosulfan sulfate	0.00033	480	9.6	0.0112	No	--

[a] RAGs obtained from the 100 Area RDR/RAWP (DOE-RL 2009b).

[b] Hanford Site-specific background value is not available; it was not evaluated during background study. Value used is from *Natural Background Soil Metals Concentrations in Washington State* (Ecology 1994).

[c] Where cleanup levels are less than background, cleanup levels default to background per WAC 173-340-700(4)(d) (Ecology 1996). The arsenic cleanup level of 20 mg/kg has been agreed to by the Tri-Party Agreement project managers as discussed in Section 2.1.2.1 of the 100 Area RDR/RAWP (DOE-RL 2009b).

[d] Carcinogenic cleanup level calculated based on the inhalation exposure pathway (WAC 173-340-750[3], Ecology 1996) using an airborne particulate mass-loading rate of 0.0001 g/m^3 (*Hanford Guidance for Radiological Cleanup* [WDOH 1997]).

[e] No Hanford Site-specific or Washington State background value available.

[f] No parameters (bioconcentration factors or ambient water quality criteria values) are available from the Washington State Department of Ecology Cleanup Levels and Risk Calculations database or other databases to calculate cleanup levels (WAC 173-340-730[3][a][iii], 1996 [Method B for surface waters]).

[g] Based on RESRAD modeling discussed in Appendix C of the 100 Area RDR/RAWP (DOE-RL 2009b), the residual concentrations of vanadium, benzo(a)pyrene, and benzo(b)fluoranthene are not predicted to migrate vertically within 1,000 years (based on the lowest distribution coefficient of the contaminants exceeding RAGs, benzo(b)fluoranthene, with a distribution coefficient value of 803 mL/g). The distance to groundwater from the bottom of the excavation area is 16.0 m (52.5 ft). Therefore, residual concentrations of these constituents are predicted to be protective of groundwater and the Columbia River.

[h] Where cleanup levels are less than RDLs, cleanup levels default to RDLs per WAC 173-340-707(2) (Ecology 1996).

-- = not applicable
BG = background
COPC = contaminant of potential concern
RAG = remedial action goal
RDL = required detection limit
RDR/RAWP = Remedial Design Report/Remedial Action Work
RESRAD = RESidual RADioactivity (dose model)
TPH = total petroleum hydrocarbons
UCL = upper confidence limit
WAC = *Washington Administrative Code*

Table 6. Comparison of Contaminant Concentrations to Action Levels for the 100-D-62, 100-D-77, and 100-D-83:1 Staging Pile Area Decision Unit Statistical Verification Samples. (2 Pages)

COPC	Statistical or Maximum Result [b] (mg/kg)	Remedial Action Goals (mg/kg) [a]			Does the Result Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Antimony [c]	0.87 (<BG)	32	5 [d]	5 [d]	No	--
Arsenic	2.5 (<BG)	20 [d]	20 [d]	20 [d]	No	--
Barium	57.6 (<BG)	5,600	200	400	No	--
Beryllium	0.18 (<BG)	10.4 [e]	1.51 [d]	1.51 [d]	No	--
Boron [f]	1.2	7,200	320	-- [g]	No	--
Cadmium [c]	0.12 (<BG)	13.9 [e]	0.81 [d]	0.81 [d]	No	--
Chromium	7.9 (<BG)	80,000	18.5 [d]	18.5 [d]	No	--
Cobalt	7.6 (<BG)	24	15.7 [d]	-- [g]	No	--
Copper	15.2 (<BG)	2,960	59.2	22.0 [d]	No	--
Hexavalent chromium [f]	0.313	2.1 [e]	4.8	2	No	--
Lead	5.0 (<BG)	353	10.2 [d]	10.2 [d]	No	--
Manganese	287 (<BG)	3,760	512 [d]	512 [d]	No	--
Mercury	0.034 (<BG)	24	0.33 [d]	0.33 [d]	No	--
Molybdenum [f]	0.29	400	8	-- [g]	No	--
Nickel	10.3 (<BG)	1,600	19.1 [d]	27.4	No	--
Vanadium	52.8 (<BG)	560	85.1 [d]	-- [g]	No	--
Zinc	43.0 (<BG)	24,000	480	67.8 [d]	No	--
Chloride	9.3 (<BG)	--	25,000	-- [g]	No	--
Nitrogen in nitrate	1.7 (<BG)	128,000	1,000	2,000	No	--
Nitrogen in nitrite and nitrate	1.5 (<BG)	128,000	1,000	2,000	No	--
Sulfate	13.0 (<BG)	NA	25,000	-- [g]	No	--
TPH (diesel range)	5.9	200	200	200	No	--
TPH (diesel range extended)	14	200	200	200	No	--
Benzo(a)anthracene	0.018	1.37	0.015 [h]	0.015 [h]	Yes	Yes [i]
Benzo(a)pyrene	0.033	0.137	0.015 [h]	0.015 [h]	Yes	Yes [i]
Benzo(b)fluoranthene	0.033	1.37	0.015 [h]	0.015 [h]	Yes	Yes [i]
Benzo(ghi)perylene [j]	0.025	2,400	48	192	No	--
Benzo(k)fluoranthene	0.0090	1.37	0.015 [h]	0.015 [h]	No	--
Chrysene	0.028	13.7	0.12	0.1 [h]	No	--
Fluoranthene	0.046	3,200	64	18.0	No	--
Indeno(1,2,3-cd)pyrene	0.021	1.37	0.33 [h]	0.33 [h]	No	--

Table 6. Comparison of Contaminant Concentrations to Action Levels for the 100-D-62, 100-D-77, and 100-D-83:1 Staging Pile Area Decision Unit Statistical Verification Samples. (2 Pages)

COPC	Statistical or Maximum Result [b] (mg/kg)	Remedial Action Goals (mg/kg) [a]			Does the Result Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Pyrene	0.060	2,400	48	192	No	--
Aroclor-1260	0.0086	0.5	0.017 [h]	0.017 [h]	No	--

[a] RAGs obtained from the 100 Area RDR/RAWP (DOE-RL 2009b).
[b] Maximum or 95% UCL, depending on data censorship, as described in the *100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Cleanup Verification 95% UCL Calculations* (Appendix C).
[c] Hanford Site-specific background value is not available; it was not evaluated during background study. Value used is from *Natural Background Soil Metals Concentrations in Washington State* (Ecology 1994).
[d] Where cleanup levels are less than background, cleanup levels default to background per WAC 173-340-700(4)(d) (Ecology 1996). The arsenic cleanup level of 20 mg/kg has been agreed to by the Tri-Party Agreement project managers as discussed in Section 2.1.2.1 of the 100 Area RDR/RAWP (DOE-RL 2009b).
[e] Carcinogenic cleanup level calculated based on the inhalation exposure pathway (WAC 173-340-750[3], Ecology 1996) using an airborne particulate mass-loading rate of 0.0001 g/m^3 (*Hanford Guidance for Radiological Cleanup* [WDOH 1997]).
[f] No Hanford Site-specific or Washington State background value available.
[g] No parameters (bioconcentration factors or ambient water quality criteria values) are available from the Washington State Department of Ecology Cleanup Levels and Risk Calculations database or other databases to calculate cleanup levels (WAC 173-340-730[3][a][iii], 1996 [Method B for surface waters]).
[h] Where cleanup levels are less than RDLs, cleanup levels default to RDLs per WAC 173-340-707(2) (Ecology 1996).
[i] Based on RESRAD modeling discussed in Appendix C of the 100 Area RDR/RAWP (DOE-RL 2009b), the residual concentrations of benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene are not predicted to migrate vertically within 1,000 years (based on the lowest distribution coefficient of the contaminants exceeding RAGs, benzo(a)anthracene, with a distribution coefficient value of 360 mL/g). The distance to groundwater from SPAs is approximately 24.5 m (80.4 ft). Therefore, residual concentrations of these constituents are predicted to be protective of groundwater and the Columbia River.
[j] Toxicity data for this chemical are not available. Cleanup levels are based on the following surrogate chemicals: Contaminant: benzo(g,h,i)perylene, surrogate: pyrene.

-- = not applicable
BG = background
COPC = contaminant of potential concern
RAG = remedial action goal
RDL = required detection limit
RDR/RAWP = Remedial Design Report/Remedial Action Work Plan
RESRAD= RESidual RADioactivity (dose model)
SPA = staging pile area
TPH = total petroleum hydrocarbons
UCL = upper confidence limit
WAC = *Washington Administrative Code*

Of the other PAH results for location EXC-3 (sample J1PW83 and duplicate J1PW93), only those results determined using EPA method 8310 are reported for cleanup evaluation in accordance with the VWI (WCH 2013e). Other PAH results are reported from the SVOC analysis by method 8270. The maximum results for benzo(a)anthracene (1.8 mg/kg) and benzo(b)fluoranthene (2.1 mg/kg) determined by method 8270 (SVOC analysis) exceed direct exposure RAGs. The EXC-3 location is the only location where PAH concentrations determined by method 8270 exceed direct exposure. The results are due to cross-contamination with asphalt. Therefore, the PAH results determined using EPA method 8270 are not considered for cleanup verification evaluation.

As discussed, multiple organics were measured above groundwater and/or river protection RAGs at the EXC-3 sample location due to cross-contamination of asphalt. Of these asphaltic materials, carbazole was measured at 0.57 mg/kg, which is above the groundwater protection value of 0.438 mg/kg. Because of the low distribution coefficient (K_d) for carbazole in the RDR/RAWP (DOE-RL 2009b), $K_d = 3.39$, inadequate vadose zone is available to demonstrate protection of groundwater. Carbazole was not detected at any other verification sample location. The presence of carbazole at the EXC-3 location (sample J1PW83 and duplicate J1PW93) is attributed to cross-contamination of asphalt and is not considered indicative of residual contamination from the waste sites. Therefore, the carbazole result is not evaluated for compliance with RAGs.

CLEANUP VERIFICATION DATA EVALUATION

This section demonstrates that remedial action at the 100-D-62, 100-D-77, and 100-D-83:1 waste sites achieves the applicable RAGs developed to support unrestricted land use at the 100 Area as established in the Remaining Sites ROD (EPA 1999) and documented in the 100 Area RDR/RAWP (DOE-RL 2009b).

Attainment of Radionuclide RAGS

Radionuclides were not COPCs for the 100-D-62, 100-D-77, and 100-D-83:1 waste sites.

Attainment of Nonradionuclide RAGS

Direct Exposure RAG Evaluation

All COPCs from the 100-D-62, 100-D-77, and 100-D-83:1 waste sites were quantified below direct exposure RAGs. As discussed above, the presence of PAH (benzo(a)pyrene, benzo(a)anthracene, and benzo(b)fluoranthene) attributed to cross-contamination of asphalt are not considered for evaluation with direct exposure RAGs.

Nonradionuclide Soil RAGs for Groundwater and River Protection Evaluation

All COPCs were quantified below groundwater and/or river protection soil RAGs with the exception of vanadium, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene. However, given the lowest soil K_d of these contaminants (chrysene) of 200 mL/g, none of the COPCs are expected to migrate vertically in 1,000 years based on RESidual RADioactivity (RESRAD) modeling discussed in Appendix C the 100 Area RDR/RAWP (DOE-RL 2009b). The vadose zone beneath the 100-D-62, 100-D-77, and 100-D-83:1 excavation area is approximately 16.0 m (52.5 ft) thick. Therefore, residual concentrations of all constituents exceeding groundwater and/or river protection soil RAGs are predicted to be protective of groundwater and the Columbia River.

Three-Part Test for Nonradionuclides

A RAG requirement for nonradionuclides is the WAC 173-340-740(7)(e) three-part test, which consists of the following criteria: (1) the cleanup verification 95% UCL value must be less than the cleanup level, (2) no single detection shall exceed two times the cleanup criteria, and (3) the percentage of samples exceeding the cleanup criteria must be less than 10% of the data set.

The application of the three-part test for the 100-D-62, 100-D-77, and 100-D-83:1 waste sites is included in the statistical calculations, where half or more of the data set was detected (Appendix C). The results of this evaluation indicate that residual COPC concentrations pass the three-part test in comparison against applicable RAGs. Therefore, residual concentrations of COPCs are predicted to be protective of groundwater and the Columbia River.

An additional application of the three-part test is included for the statistical data sets that default to the maximum because less than half of the data set was detected. The results of this evaluation indicate that all residual COPC concentrations defaulting to the maximum value pass the three-part test in comparison against applicable RAGs, with the exception of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and carbazole in the excavation area, and benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene in the SPAs. In the excavation area, the concentrations of benzo(a)anthracene and benzo(b)fluoranthene, as measured by SVOC analysis (EPA method 8270), above direct exposure RAGs and carbazole above groundwater/river protection RAGs were measured at the EXC-3 sample location. Cross-contamination from a former asphalt road was evident in the area of this sample location. Therefore, the concentrations of benzo(a)anthracene and benzo(b)fluoranthene measured above direct exposure RAGs by SVOC analysis and carbazole above groundwater protection RAGs at the EXC-3 location are attributed to cross-contamination of asphalt and are not evaluated for compliance with applicable RAGs. Residual concentrations of COPCs that fail one or more parts of the three-part test at the excavation area and SPAs, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene, are not predicted to migrate vertically within 1,000 years (based on the lowest K_d of the contaminants exceeding RAGs, chrysene, with a K_d value of 200 mL/g). The distance to groundwater from the excavation area and SPAs is 16.0 m (52.5 ft) and 24.5 m (80.4 ft), respectively. Therefore, residual concentrations of these constituents are predicted to be protective of groundwater and the Columbia River.

Nonradionuclide Direct Contact Hazard Quotient and Carcinogenic Risk RAGs Attained

Nonradionuclide risk requirements include an individual hazard quotient of less than 1.0, a cumulative hazard quotient of less than 1.0, an individual contaminant carcinogenic risk of less than 1×10^{-6}, and a cumulative carcinogenic risk of less than 1×10^{-5}. The risk values were not calculated for constituents that were either not detected or were detected at concentrations below Hanford Site or Washington State background. All individual hazard quotients for noncarcinogenic constituents were less than 1.0. The cumulative hazard quotient for those noncarcinogenic constituents above background or detected levels is 2.1×10^{-1}. The individual carcinogenic risk values for the carcinogenic constituents detected above background are less than 1 x 10^{-6}, and the cumulative carcinogenic risk value was 1.7 x 10^{-6}, which is less than 1 x 10^{-5}. The 100-D-62, 100-D-77, and 100-D-83:1 waste sites meet the requirements for the direct contact hazard quotient and excess carcinogenic risk as identified in the RDR/RAWP (DOE-RL 2009b).

Nonradionuclide Groundwater Hazard Quotient and Carcinogenic Risk RAGs Attained

Assessment of the risk requirements for the 100-D-62, 100-D-77, and 100-D-83:1 waste sites included calculation of the hazard quotient and carcinogenic (excess cancer) risk values for groundwater protection for nonradionuclides. The requirements include an individual and cumulative hazard quotient of less than 1.0, an individual excess carcinogenic risk of less than 1 x 10^{-6}, and a cumulative excess carcinogenic risk of less than 1 x 10^{-5}. These risk values were conservatively calculated for the entire subsite using the highest value for each COPC from each of the decision units. Risk values were calculated for constituents that were detected at concentrations above Hanford Site or Washington State background values or for which there is no background value. In addition, the K_d values for these contaminants are less than that necessary to show no migration to groundwater in 1,000 years based on RESRAD modeling discussed in Appendix C of the RDR/RAWP (DOE-RL 2009b). Based on this model and a vadose zone of approximately 16.0 m (52.5 ft) in thickness at the excavation, a K_d of 4.6 or greater is required to show no predicted migration to groundwater in 1,000 years. All individual hazard quotients for noncarcinogenic constituents are less than 1.0. The cumulative hazard quotient for the 100-D-62, 100-D-77, and 100-D-83:1 waste sites is 1.1 x 10^{-1}, which is less than 1.0. The 100-D-62, 100-D-77, and 100-D-83:1 waste sites do not have any carcinogenic constituents subject to groundwater cancer risk calculation; therefore, the criterion for excess cancer risk is met. Therefore, nonradionuclide risk requirements related to groundwater are met.

DATA QUALITY ASSESSMENT

A data quality assessment (DQA) was performed on both the confirmatory and verification data. The DQA compared the sampling approach, the field logbooks (WCH 2012a, 2013a, 2013b, and 2013c), and resulting analytical data with the sampling and data quality requirements specified by the project objectives and performance specifications. The DQA for the 100-D-62, 100-D-77, and 100-D-83:1 waste sites established that the data are of the right type, quality, and quantity to support site verification decisions within specified error tolerances. The evaluation verified that the sample design was sufficient for the purpose of clean site verification. The cleanup verification sample analytical data are stored in the ENRE project-specific database for data evaluation prior to its archival in the HEIS and are summarized in Appendix C. The detailed DQA is presented in Appendix D.

SUMMARY FOR INTERIM CLOSURE

The 100-D-62, 100-D-77, and 100-D-83:1waste sites have been evaluated in accordance with the Remaining Sites ROD (EPA 1999) and the RDR/RAWP (DOE-RL 2009b). Verification sampling was performed and the analytical results indicate that the residual concentrations of

COPCs at this subsite meet the remedial action objectives for direct exposure, groundwater protection, and river protection. In accordance with this evaluation, the verification sampling results support a reclassification of the 100-D-62, 100-D-77, and 100-D-83:1 waste sites to Interim Closed Out. Contamination from the 100-D-62, 100-D-77, and 100-D-83:1 waste sites was removed from the deep zone (greater than 4.6 m [15 ft] bgs); therefore, institutional controls to prevent uncontrolled drilling or excavation into the deep zone of the site are not required.

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APPENDIX A

ECOLOGICAL RISK COMPARISON TABLE

Table A-1. Maximum Contaminant Concentrations that Exceed Ecological Screening Levels for the 100-D-62, 100-D-77, and 100-D-83:1 Waste Sites [a].

Hazardous Substance		2007 WAC 173-340 Table 749-3			EPA Ecological Soil Screening Levels [b]				Waste Site Analyses
		Plants	Soil Biota	Wildlife	Plants	Soil Biota	Avian [c]	Mammalian [c]	
Metals (mg/kg)									
	Background								
Antimony	5	5	--	--	--	78	--	0.27	1.1 (<BG)
Boron	--	0.5	--	--	--	--	--	--	1.7
Manganese	512	1,100 [d]	--	1,500	220	450	4,300	4,000	337 (<BG)
Mercury, inorganic	0.33	0.3	0.1	5.5	--	--	--	--	0.15 (<BG)
Vanadium	85.1	2	--	--	--	--	7.8	280	113
Zinc	67.8	86 [d]	200	360	160	120	46	79	50.3 (<BG)
High molecular weight PAH [e]	--	--	--	--	--	18	--	1.1	3.9 [f]

NOTE. Shaded cells indicate screening values that are exceeded.

[a] Exceedance of screening values does not necessarily indicate the existence of risk to ecological receptors. All exceedances must be evaluated in the context of additional lines of evidence for ecological effects following a baseline risk assessment for the river corridor portion of the Hanford Site, which will include a more complete quantitative ecological risk assessment.

[b] Available on the Internet at www.epa.gov/ecotox/ecossl.

[c] Wildlife.

[d] Benchmark replaced by Washington State natural background concentration from Ecology, 1994, *Natural Background Soil Metals Concentrations in Washington State*, Publication 94-115, Washington State Department of Ecology, Olympia, Washington.

[e] High molecular weight polynuclear aromatic hydrocarbons, e.g., benzo(a)anthracene, benzo(a)pyrene, benzo(g,h,i)perylene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz[a,h]anthracene, indeno[1,2,3-cd]pyrene, perylene, and pyrene.

[f] PAH contamination is attributed to cross-contamination from asphalt.

-- = not available
BG = background
EPA = U.S. Environmental Protection Agency
PAH = polycyclic aromatic hydrocarbons
WAC = *Washington Administrative Code*

APPENDIX B

IN-PROCESS SAMPLES

Table B-1. 100-D-62, 100-D-77, 100-D-83:1 Waste Characterization and In-Process Samples - Anions. (3 Pages)

Location	HEIS Number	Sample Date	Node	Northing	Easting	Bromide			Chloride			Fluoride			Nitrogen in Nitrate		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-D-62	J1H217	4/25/2011	NA	151154	573256	0.5	UN	0.5	19.9		2.5	1.1	UN	1.1	331	D	2
100-D-62	J1H230	4/25/2011	NA	151154	573256	1	U	1	45.3		5.1	6.4	B	2.1	0.82	U	0.82
100-D-62	J1HNK6	5/11/2011	NA	151156	573256												
100-D-62	J1HNK7	5/11/2011	NA	151156	573256												
100-D-77	J1H213	4/25/2011	NA	151222	573248	0.41	U	0.41	2.1	U	2.1	0.88	UN	0.88	0.68	B	0.34
100-D-77	J1H215	5/4/2011	NA	151192	573258	0.41	U	0.41	2.1	U	2.1	2.3	BN	0.88	0.82	B	0.33
100-D-77	J1H216	4/25/2011	NA	151185	573239	0.46	U	0.46	4.5	B	2.3	4.6	B	0.97	0.69	B	0.37
100-D-77	J1J4W7	5/11/2011	NA			0.5	U	0.5	2.5	U	2.5	1.8	BN	1.1	10.2		0.4
100-D-77	J1JW09	6/16/2011	NA	151224.8	573251.1												
100-D-77	J1JW10	6/16/2011	NA	151223.3	573253.2												
100-D-77	J1K4D1	7/11/2011	1	151240.3	573255	0.4	U	0.4	2.6	B	2	0.84	U	0.84	4.5		0.32
100-D-77	J1K4D2	7/11/2011	2	151223.9	573255.5	0.47	U	0.47	2.4	U	2.4	0.99	U	0.99	1.3	B	0.38
100-D-77	J1K4D3	7/11/2011	3	151222.8	573249.6	0.4	U	0.4	2.1	B	2	0.99	BN	0.85	2.4	B	0.33
100-D-77	J1K4D4	7/11/2011	4	151208.1	573251.7	0.4	B	0.39	4.5	B	2	0.82	U	0.82	4.3		0.31
100-D-77	J1K4D5	7/11/2011	5	151204.6	573266.2	0.44	U	0.44	2.3	U	2.3	0.94	U	0.94	0.7	B	0.36
100-D-77	J1K4D6	7/11/2011	6	151191.2	573260.1	0.39	U	0.39	3.1	B	2	0.83	U	0.83	0.66	B	0.32
100-D-77	J1K4D7	7/11/2011	7	151187.5	573233.9	0.38	U	0.38	2.2	B	1.9	0.8	U	0.8	0.78	B	0.31
100-D-77	J1K4D8	7/11/2011	8	151182.6	573251.6	0.39	U	0.39	2.3	B	2	0.83	U	0.83	1.6	B	0.32
100-D-77	J1K4D9	7/11/2011	9	151158.4	573257.6	0.38	U	0.38	2.3	B	1.9	0.81	U	0.81	1.4	B	0.31
100-D-77	J1K4F0	7/11/2011	10	151150.6	573254.9	0.39	U	0.39	6.2		2	0.83	B	0.82	3.7		0.31
100-D-77	J1K4H7	7/6/2011	NA	151223	573251	0.44	U	0.44	2.2	U	2.2	0.94	U	0.94	0.46	B	0.36
100-D-77	J1K4H8	7/6/2011	NA	151223	573250	0.42	U	0.42	2.1	U	2.1	0.89	U	0.89	1.9	B	0.34
100-D-77	J1K4H9	7/6/2011	NA	151222	573247	0.41	U	0.41	2.1	U	2.1	0.87	U	0.87	1.2	B	0.33
100-D-77	J1N0H9	12/15/2011	NA	151241	573250.8												
100-D-77	J1N0J0	12/15/2011	NA	151234.4	573242.7												
100-D-77	J1N0J1	12/15/2011	NA	151225	573240.9												
100-D-77	J1N0J2	12/15/2011	NA	151220	573235.7												
100-D-77	J1N0J3	12/15/2011	NA	151212.7	573241.7												
100-D-77	J1N0J4	12/15/2011	NA	151180.1	573277.6												
100-D-77	J1N0J5	12/15/2011	NA	151184.4	573278.4												
100-D-77	J1N0J6	12/15/2011	NA	151186.1	573273.9												
100-D-77	J1N0J7	12/15/2011	NA	151190.1	573273.5												
100-D-77	J1N0J8	12/15/2011	NA	151196.9	573273.6												
100-D-77	J1N0J9	12/19/2011	NA	151207.8	573263.9												
100-D-77	J1N0K0	12/19/2011	NA	151214.4	573270.5												
100-D-77	J1N0K1	12/19/2011	NA	151220.4	573267.2												
100-D-77	J1N0K2	12/19/2011	NA	151219.6	573260.9												
100-D-77	J1N0K3	12/19/2011	NA	151228.2	573265.3												
100-D-77	J1N1K4	1/3/2012	NA	151222.4	573249.8												
100-D-77	J1N1K5	1/3/2012	NA	151224.8	573252.4												
100-D-77	J1N1K6	1/3/2012	NA	151229.6	573252.9												
100-D-77	J1N1K7	1/3/2012	NA	151227.7	573258.1												
100-D-77	J1N1K8	1/3/2012	NA	151221.6	573257.3												
100-D-77	J1N215	1/9/2012	NA	151222.8	573248.9	0.43	U	0.43	2.2	U	2.2	0.9	UN	0.9	1.2	B	0.35
100-D-77	J1N216	1/9/2012	NA	151221.8	573249	0.4	U	0.4	2	U	2	0.84	U	0.84	0.82	B	0.32
100-D-77	J1N217	1/9/2012	NA	151222.2	573249.6	0.41	U	0.41	2.1	U	2.1	0.87	U	0.87	1	B	0.33
100-D-77	J1N218	1/9/2012	NA	151224.4	573251.6	0.4	U	0.4	2.1	B	2	0.85	U	0.85	0.79	B	0.32
100-D-77	J1N219	1/9/2012	NA	151228.4	573254.8	0.39	U	0.39	2	U	2	1.5	B	0.83	0.74	B	0.32
100-D-77	J1N220	1/9/2012	NA	151225	573254.5	0.4	U	0.4	2	U	2	0.85	U	0.85	0.89	B	0.33
100-D-77	J1N221	1/9/2012	NA	151223.8	573258	0.4	U	0.4	2	U	2	2	B	0.84	0.86	B	0.32
100-D-77	J1N222	1/9/2012	NA	151183.7	573252.3	0.4	U	0.4	2	U	2	0.84	U	0.84	0.53	B	0.32
100-D-77	J1N223	1/9/2012	NA	151185	573255.3	0.41	U	0.41	3.9	B	2.1	0.87	U	0.87	0.64	B	0.33
100-D-77	J1N224	1/9/2012	NA	151186.4	573257.6	0.41	U	0.41	9.9		2.1	0.86	U	0.86	0.72	B	0.33

B - General chemistry and metals, estimated result. Result is less than the RL, but greater than MDL. Organics, analyte was found in the associated method blank as well as in the sample.

C - The analyte was detected in both the sample and the associated QC blank, and the sample concentration was </= 5X the blank concentration.

D - Sample results are obtained from a dilution; the surrogate or matrix spike recoveries reported are calculated from diluted samples.

J - Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

M - Sample duplicate precision not met.

N - Metals, recovery exceeds upper or lower control limits. General chemistry, MS, MSD: spike recovery exceeds upper or lower control limits. Organics, presumptive evidence of material.

P - Flag is used for an aroclor target analyte where there is greater than 25% difference for detected concentrations between the two GC columns.

U - Analyzed for but not detected.

X - Metals, serial dilution in the analytical batch indicates that physical and chemical interferences are present. Organics, more than 40% difference between columns, lower result reported.

Table B-1. 100-D-62, 100-D-77, 100-D-83:1 Waste Characterization and In-Process Samples - Anions. (3 Pages)

Location	HEIS Number	Sample Date	Node	Northing	Easting	Nitrogen in Nitrite			Nitrogen in Nitrite and Nitrate			Phosphorous in phosphate			Sulfate		
						mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-D-62	J1H217	4/25/2011	NA	151154	573256	0.43	U	0.43	367	DN	4.6	1.6	UN	1.6	2620	DN	11.1
100-D-62	J1H230	4/25/2011	NA	151154	573256	0.87	U	0.87	0.93	U	0.93	3.2	UN	3.2	593		4.5
100-D-62	J1HNK6	5/11/2011	NA	151156	573256												
100-D-62	J1HNK7	5/11/2011	NA	151156	573256												
100-D-77	J1H213	4/25/2011	NA	151222	573248	0.36	U	0.36	0.62	B	0.38	1.3	UN	1.3	1480	DN	9.2
100-D-77	J1H215	5/4/2011	NA	151192	573258	0.36	U	0.36	0.77	BM	0.38	1.3	UN	1.3	56.2	N	1.8
100-D-77	J1H216	4/25/2011	NA	151185	573239	0.4	U	0.4	0.67	B	0.42	1.5	U	1.5	33.6		2
100-D-77	J1J4W7	5/11/2011	NA			0.43	U	0.43	10.1		0.45	2	BMN	1.6	2610	DN	11.1
100-D-77	J1JW09	6/16/2011	NA	151224.8	573251.1												
100-D-77	J1JW10	6/16/2011	NA	151223.3	573253.2												
100-D-77	J1K4D1	7/11/2011	1	151240.3	573255	0.34	U	0.34	4.2		0.31	1.3	U	1.3	458		1.8
100-D-77	J1K4D2	7/11/2011	2	151223.9	573255.5	0.4	U	0.4	1.8		0.37	1.5	U	1.5	695	D	10.4
100-D-77	J1K4D3	7/11/2011	3	151222.8	573249.6	0.35	U	0.35	2		0.31	1.3	UN	1.3	7010	DN	35.9
100-D-77	J1K4D4	7/11/2011	4	151208.1	573251.7	0.34	U	0.34	3.6		0.3	1.2	U	1.2	62.4		1.7
100-D-77	J1K4D5	7/11/2011	5	151204.6	573266.2	0.38	U	0.38	0.84	BM	0.35	1.4	U	1.4	30		2
100-D-77	J1K4D6	7/11/2011	6	151191.2	573260.1	0.34	U	0.34	0.66	B	0.3	1.3	U	1.3	320		1.8
100-D-77	J1K4D7	7/11/2011	7	151187.5	573233.9	0.33	U	0.33	0.9		0.3	1.2	U	1.2	90.7		1.7
100-D-77	J1K4D8	7/11/2011	8	151182.6	573251.6	0.34	U	0.34	0.3	B	0.3	1.3	U	1.3	135		1.7
100-D-77	J1K4D9	7/11/2011	9	151158.4	573257.6	0.33	U	0.33	1.2		0.3	1.2	U	1.2	21.6		1.7
100-D-77	J1K4F0	7/11/2011	10	151150.6	573254.9	0.34	U	0.34	4.1		0.3	1.2	U	1.2	233		1.7
100-D-77	J1K4H7	7/6/2011	NA	151223	573251	0.38	U	0.38	0.45	B	0.32	1.4	U	1.4	4360	D	19.7
100-D-77	J1K4H8	7/6/2011	NA	151223	573250	0.36	U	0.36	2		0.34	1.3	UN	1.3	17400	DN	93.9
100-D-77	J1K4H9	7/6/2011	NA	151222	573247	0.36	U	0.36	1.4		0.33	1.3	U	1.3	14600	D	92
100-D-77	J1N0H9	12/15/2011	NA	151241	573250.8												
100-D-77	J1N0J0	12/15/2011	NA	151234.4	573242.7												
100-D-77	J1N0J1	12/15/2011	NA	151225	573240.9												
100-D-77	J1N0J2	12/15/2011	NA	151220	573235.7												
100-D-77	J1N0J3	12/15/2011	NA	151212.7	573241.7												
100-D-77	J1N0J4	12/15/2011	NA	151180.1	573277.6												
100-D-77	J1N0J5	12/15/2011	NA	151184.4	573278.4												
100-D-77	J1N0J6	12/15/2011	NA	151186.1	573273.9												
100-D-77	J1N0J7	12/15/2011	NA	151190.1	573273.5												
100-D-77	J1N0J8	12/15/2011	NA	151196.9	573273.6												
100-D-77	J1N0J9	12/19/2011	NA	151207.8	573263.9												
100-D-77	J1N0K0	12/19/2011	NA	151214.4	573270.5												
100-D-77	J1N0K1	12/19/2011	NA	151220.4	573267.2												
100-D-77	J1N0K2	12/19/2011	NA	151219.6	573260.9												
100-D-77	J1N0K3	12/19/2011	NA	151228.2	573265.3												
100-D-77	J1N1K4	1/3/2012	NA	151222.4	573249.8												
100-D-77	J1N1K5	1/3/2012	NA	151224.8	573252.4												
100-D-77	J1N1K6	1/3/2012	NA	151229.6	573252.9												
100-D-77	J1N1K7	1/3/2012	NA	151227.7	573258.1												
100-D-77	J1N1K8	1/3/2012	NA	151221.6	573257.3												
100-D-77	J1N215	1/9/2012	NA	151222.8	573248.9	0.37	U	0.37	0.55	BM	0.32	1.4	UN	1.4	4710	DN	19
100-D-77	J1N216	1/9/2012	NA	151221.8	573249	0.34	U	0.34	0.32	U	0.32	1.3	U	1.3	3360	D	17.6
100-D-77	J1N217	1/9/2012	NA	151222.2	573249.6	0.36	U	0.36	0.83		0.31	1.3	U	1.3	3640	D	18.4
100-D-77	J1N218	1/9/2012	NA	151224.4	573251.6	0.35	U	0.35	0.53	B	0.3	1.3	U	1.3	1940	D	8.9
100-D-77	J1N219	1/9/2012	NA	151228.4	573254.8	0.34	U	0.34	0.42	B	0.3	1.3	U	1.3	694	D	8.8
100-D-77	J1N220	1/9/2012	NA	151225	573254.5	0.35	U	0.35	0.97		0.3	1.3	U	1.3	1300	D	9
100-D-77	J1N221	1/9/2012	NA	151223.8	573258	0.34	U	0.34	0.48	B	0.3	1.3	U	1.3	408		1.8
100-D-77	J1N222	1/9/2012	NA	151183.7	573252.3	0.34	U	0.34	0.3	U	0.3	1.3	U	1.3	4	BC	1.8
100-D-77	J1N223	1/9/2012	NA	151185	573255.3	0.35	U	0.35	0.32	U	0.32	1.3	U	1.3	16.3		1.8
100-D-77	J1N224	1/9/2012	NA	151186.4	573257.6	0.35	U	0.35	0.35	B	0.31	1.3	U	1.3	26		1.8

Table B-1. 100-D-62, 100-D-77, 100-D-83:1 Waste Characterization and In-Process Samples - Anions. (3 Pages)

Location	HEIS Number	Sample Date	Node	Northing	Easting	Sulfide			pH		
						mg/kg	Q	PQL	pH	Q	PQL
100-D-62	J1H217	4/25/2011	NA	151154	573256				7.41		0.01
100-D-62	J1H230	4/25/2011	NA	151154	573256				10.7		0.01
100-D-62	J1HNK6	5/11/2011	NA	151156	573256						
100-D-62	J1HNK7	5/11/2011	NA	151156	573256						
100-D-77	J1H213	4/25/2011	NA	151222	573248				5.15		0.01
100-D-77	J1H215	5/4/2011	NA	151192	573258				11.8		0.01
100-D-77	J1H216	4/25/2011	NA	151185	573239				9.88		0.01
100-D-77	J1J4W7	5/11/2011	NA						3.7		0.01
100-D-77	J1JW09	6/16/2011	NA	151224.8	573251.1						
100-D-77	J1JW10	6/16/2011	NA	151223.3	573253.2						
100-D-77	J1K4D1	7/11/2011	1	151240.3	573255				8.22		0.01
100-D-77	J1K4D2	7/11/2011	2	151223.9	573255.5				8.11		0.01
100-D-77	J1K4D3	7/11/2011	3	151222.8	573249.6				7.32		0.01
100-D-77	J1K4D4	7/11/2011	4	151208.1	573251.7				8.77		0.01
100-D-77	J1K4D5	7/11/2011	5	151204.6	573266.2				9.34		0.01
100-D-77	J1K4D6	7/11/2011	6	151191.2	573260.1				9.36		0.01
100-D-77	J1K4D7	7/11/2011	7	151187.5	573233.9				9.41		0.01
100-D-77	J1K4D8	7/11/2011	8	151182.6	573251.6				9.57		0.01
100-D-77	J1K4D9	7/11/2011	9	151158.4	573257.6				8.89		0.01
100-D-77	J1K4F0	7/11/2011	10	151150.6	573254.9				8.54		0.01
100-D-77	J1K4H7	7/6/2011	NA	151223	573251				4.92		0.01
100-D-77	J1K4H8	7/6/2011	NA	151223	573250				4.69		0.01
100-D-77	J1K4H9	7/6/2011	NA	151222	573247				5.9		0.01
100-D-77	J1N0H9	12/15/2011	NA	151241	573250.8						
100-D-77	J1N0J0	12/15/2011	NA	151234.4	573242.7						
100-D-77	J1N0J1	12/15/2011	NA	151225	573240.9						
100-D-77	J1N0J2	12/15/2011	NA	151220	573235.7						
100-D-77	J1N0J3	12/15/2011	NA	151212.7	573241.7						
100-D-77	J1N0J4	12/15/2011	NA	151180.1	573277.6						
100-D-77	J1N0J5	12/15/2011	NA	151184.4	573278.4						
100-D-77	J1N0J6	12/15/2011	NA	151186.1	573273.9						
100-D-77	J1N0J7	12/15/2011	NA	151190.1	573273.5						
100-D-77	J1N0J8	12/15/2011	NA	151196.9	573273.6						
100-D-77	J1N0J9	12/19/2011	NA	151207.8	573263.9						
100-D-77	J1N0K0	12/19/2011	NA	151214.4	573270.5						
100-D-77	J1N0K1	12/19/2011	NA	151220.4	573267.2						
100-D-77	J1N0K2	12/19/2011	NA	151219.6	573260.9						
100-D-77	J1N0K3	12/19/2011	NA	151228.2	573265.3						
100-D-77	J1N1K4	1/3/2012	NA	151222.4	573249.8						
100-D-77	J1N1K5	1/3/2012	NA	151224.8	573252.4						
100-D-77	J1N1K6	1/3/2012	NA	151229.6	573252.9						
100-D-77	J1N1K7	1/3/2012	NA	151227.7	573258.1						
100-D-77	J1N1K8	1/3/2012	NA	151221.6	573257.3						
100-D-77	J1N215	1/9/2012	NA	151222.8	573248.9	7.8		2.6	5.24		0.01
100-D-77	J1N216	1/9/2012	NA	151221.8	573249	2.6	U	2.6	5.22		0.01
100-D-77	J1N217	1/9/2012	NA	151222.2	573249.6	2.6	U	2.6	5.62		0.01
100-D-77	J1N218	1/9/2012	NA	151224.4	573251.6	2.5	U	2.5	6.41		0.01
100-D-77	J1N219	1/9/2012	NA	151228.4	573254.8	2.5	BN	2.5	7.52		0.01
100-D-77	J1N220	1/9/2012	NA	151225	573254.5	2.5	U	2.5	6.3		0.01
100-D-77	J1N221	1/9/2012	NA	151223.8	573258	2.4	U	2.4	7.61		0.01
100-D-77	J1N222	1/9/2012	NA	151183.7	573252.3	4.2	B	2.5	9.46		0.01
100-D-77	J1N223	1/9/2012	NA	151185	573255.3	2.5	U	2.5	9.4		0.01
100-D-77	J1N224	1/9/2012	NA	151186.4	573257.6	2.5	U	2.5	9.43		0.01

Table B-2. 100-D-62, 100-D-77, 100-D-83:1 Waste Characterization and In-Process Samples - Metals. (7 Pages)																
Location	HEIS Number	Sample Date	Northing	Easting	Aluminum			Antimony			Arsenic			Barium		
					mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-D-62	J1H217	4/25/2011	151154	573256	8100		1.9	1.7		0.46	6.9		0.8	1550		0.092
100-D-62	J1H230	4/25/2011	151154	573256	7790		4	5.5		0.97	17.8	M	1.7	2030		0.19
100-D-62	J1HNK6	5/11/2011	151156	573256												
100-D-62	J1HNK7	5/11/2011	151156	573256												
100-D-77	J1H213	4/25/2011	151222	573248	7240		1.6	0.4	U	0.4	3.3		0.7	69.2		0.08
100-D-77	J1H215	5/4/2011	151192	573258	7340	X	1.5	0.4	B	0.38	4.3		0.65	106	XN	0.075
100-D-77	J1H216	4/25/2011	151185	573239	70600		1.7	61.7		0.41	18.7		0.72	77.2		0.083
100-D-77	J1J4W7	5/11/2011			51800		16.9	0.41	U	0.41	0.72	U	0.72	15.1		0.083
100-D-77	J1JW09	6/16/2011	151224.8	573251.1												
100-D-77	J1JW10	6/16/2011	151223.3	573253.2												
100-D-77	J1K4D1	7/11/2011	151240.3	573255	5400	X	1.4	0.88		0.33	2.1		0.58	58.6	X	0.067
100-D-77	J1K4D2	7/11/2011	151223.9	573255.5	7390	X	1.9	0.51	B	0.46	2.5		0.79	61.8	X	0.091
100-D-77	J1K4D3	7/11/2011	151222.8	573249.6	6440	X	1.5	0.6		0.38	2.3		0.65	52.9	X	0.075
100-D-77	J1K4D4	7/11/2011	151208.1	573251.7	6050	X	1.3	0.6		0.32	1.5		0.56	56.2	X	0.064
100-D-77	J1K4D5	7/11/2011	151204.6	573266.2	5860	X	1.7	1.4		0.42	2		0.73	61.9	X	0.084
100-D-77	J1K4D6	7/11/2011	151191.2	573260.1	8660	X	1.3	1.2		0.33	5		0.57	210	X	0.066
100-D-77	J1K4D7	7/11/2011	151187.5	573233.9	5840	X	1.5	0.73		0.38	2.1		0.66	54.8	X	0.076
100-D-77	J1K4D8	7/11/2011	151182.6	573251.6	5650	X	1.4	0.88		0.35	2.9		0.61	89.9	X	0.07
100-D-77	J1K4D9	7/11/2011	151158.4	573257.6	6510	X	1.4	0.5	B	0.34	2.6		0.58	59.9	X	0.067
100-D-77	J1K4F0	7/11/2011	151150.6	573254.9	6640	X	1.4	0.7		0.35	2.4		0.61	75	X	0.07
100-D-77	J1K4H7	7/6/2011	151223	573251	4670	X	1.6	0.38	U	0.38	2		0.66	41.8	X	0.076
100-D-77	J1K4H8	7/6/2011	151223	573250	1470	X	1.7	0.4	U	0.4	0.89	B	0.7	95.6	X	0.081
100-D-77	J1K4H9	7/6/2011	151222	573247	2110	X	1.6	0.4	U	0.4	0.7	U	0.7	103	X	0.08
100-D-77	J1N0H9	12/15/2011	151241	573250.8												
100-D-77	J1N0J0	12/15/2011	151234.4	573242.7												
100-D-77	J1N0J1	12/15/2011	151225	573240.9												
100-D-77	J1N0J2	12/15/2011	151220	573235.7												
100-D-77	J1N0J3	12/15/2011	151212.7	573241.7												
100-D-77	J1N0J4	12/15/2011	151180.1	573277.6												
100-D-77	J1N0J5	12/15/2011	151184.4	573278.4												
100-D-77	J1N0J6	12/15/2011	151186.1	573273.9												
100-D-77	J1N0J7	12/15/2011	151190.1	573273.5												
100-D-77	J1N0J8	12/15/2011	151196.9	573273.6												
100-D-77	J1N0J9	12/19/2011	151207.8	573263.9												
100-D-77	J1N0K0	12/19/2011	151214.4	573270.5												
100-D-77	J1N0K1	12/19/2011	151220.4	573267.2												
100-D-77	J1N0K2	12/19/2011	151219.6	573260.9												
100-D-77	J1N0K3	12/19/2011	151228.2	573265.3												
100-D-77	J1N1K4	1/3/2012	151222.4	573249.8												
100-D-77	J1N1K5	1/3/2012	151224.8	573252.4												
100-D-77	J1N1K6	1/3/2012	151229.6	573252.9												
100-D-77	J1N1K7	1/3/2012	151227.7	573258.1												
100-D-77	J1N1K8	1/3/2012	151221.6	573257.3												
100-D-77	J1N215	1/9/2012	151222.8	573248.9	3560	X	1.4	0.35	U	0.35	0.61	U	0.61	44.4	X	0.07
100-D-77	J1N216	1/9/2012	151221.8	573249	4680	X	1.4	0.35	U	0.35	0.61	B	0.61	48.8	X	0.07
100-D-77	J1N217	1/9/2012	151222.2	573249.6	4340	X	1.6	0.39	U	0.39	0.68	U	0.68	41.5	X	0.078
100-D-77	J1N218	1/9/2012	151224.4	573251.6	4580	X	1.5	0.36	U	0.36	0.69	B	0.62	45.7	X	0.071
100-D-77	J1N219	1/9/2012	151228.4	573254.8	3830	X	1.6	0.39	U	0.39	0.87	B	0.67	52.2	X	0.077
100-D-77	J1N220	1/9/2012	151225	573254.5	4940	X	1.4	0.34	U	0.34	0.93		0.59	51	X	0.068
100-D-77	J1N221	1/9/2012	151223.8	573258	3970	X	1.4	0.35	U	0.35	0.67	B	0.61	49.3	X	0.07
100-D-77	J1N222	1/9/2012	151183.7	573252.3	4440	X	1.5	0.38	U	0.38	0.81	B	0.65	50.9	X	0.075
100-D-77	J1N223	1/9/2012	151185	573255.3	4750	X	1.5	0.37	U	0.37	1.2		0.64	48.6	X	0.073
100-D-77	J1N224	1/9/2012	151186.4	573257.6	4990	X	1.4	0.34	U	0.34	1.8	M	0.6	61	X	0.069

Table B-2. 100-D-62, 100-D-77, 100-D-83:1 Waste Characterization and In-Process Samples - Metals. (7 Pages)

Location	HEIS Number	Sample Date	Northing	Easting	Beryllium			Boron			Cadmium			Calcium		
					mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-D-62	J1H217	4/25/2011	151154	573256	0.04	U	0.04	6.7		1.2	5.8		0.05	14300		17.2
100-D-62	J1H230	4/25/2011	151154	573256	0.084	U	0.08	7.9	M	2.5	6.3		0.1	24300	MN	36
100-D-62	J1HNK6	5/11/2011	151156	573256												
100-D-62	J1HNK7	5/11/2011	151156	573256												
100-D-77	J1H213	4/25/2011	151222	573248	0.056	B	0.04	1	U	1	0.051	B	0.043	4270		14.9
100-D-77	J1H215	5/4/2011	151192	573258	0.033	B	0.03	3.9		0.97	0.18	BM	0.04	39000	X	13.9
100-D-77	J1H216	4/25/2011	151185	573239	0.31		0.04	6.3		1.1	0.49		0.045	11400		15.4
100-D-77	J1J4W7	5/11/2011			0.073	B	0.04	1.2	B	1.1	0.14	B	0.045	166		15.4
100-D-77	J1JW09	6/16/2011	151224.8	573251.1												
100-D-77	J1JW10	6/16/2011	151223.3	573253.2												
100-D-77	J1K4D1	7/11/2011	151240.3	573255	0.029	U	0.03	0.86	U	0.86	0.087	B	0.036	5740	X	12.4
100-D-77	J1K4D2	7/11/2011	151223.9	573255.5	0.04	U	0.04	1.5	B	1.2	0.12	B	0.049	9500	X	17
100-D-77	J1K4D3	7/11/2011	151222.8	573249.6	0.033	U	0.03	1.2	B	0.97	0.085	B	0.04	6800	X	13.9
100-D-77	J1K4D4	7/11/2011	151208.1	573251.7	0.028	U	0.03	0.93	B	0.83	0.11	B	0.035	5550	X	11.9
100-D-77	J1K4D5	7/11/2011	151204.6	573266.2	0.037	U	0.04	1.4	B	1.1	0.16	B	0.046	9420	X	15.7
100-D-77	J1K4D6	7/11/2011	151191.2	573260.1	0.029	U	0.03	2.3		0.85	0.52		0.036	21700	X	12.2
100-D-77	J1K4D7	7/11/2011	151187.5	573233.9	0.033	U	0.03	0.98	U	0.98	0.07	B	0.041	12300	X	14.1
100-D-77	J1K4D8	7/11/2011	151182.6	573251.6	0.03	U	0.03	1.7	B	0.9	0.45		0.038	21300	X	13
100-D-77	J1K4D9	7/11/2011	151158.4	573257.6	0.029	U	0.03	0.98	B	0.87	0.089	B	0.036	8200	X	12.5
100-D-77	J1K4F0	7/11/2011	151150.6	573254.9	0.03	U	0.03	1.5	B	0.9	0.12	B	0.038	7210	X	12.9
100-D-77	J1K4H7	7/6/2011	151223	573251	0.082	B	0.03	0.98	U	0.98	0.041	U	0.041	5950	X	14.1
100-D-77	J1K4H8	7/6/2011	151223	573250	0.035	U	0.04	1	U	1	0.044	U	0.044	17800	X	15
100-D-77	J1K4H9	7/6/2011	151222	573247	0.051	B	0.04	1	U	1	0.078	B	0.043	20900	X	14.9
100-D-77	J1N0H9	12/15/2011	151241	573250.8												
100-D-77	J1N0J0	12/15/2011	151234.4	573242.7												
100-D-77	J1N0J1	12/15/2011	151225	573240.9												
100-D-77	J1N0J2	12/15/2011	151220	573235.7												
100-D-77	J1N0J3	12/15/2011	151212.7	573241.7												
100-D-77	J1N0J4	12/15/2011	151180.1	573277.6												
100-D-77	J1N0J5	12/15/2011	151184.4	573278.4												
100-D-77	J1N0J6	12/15/2011	151186.1	573273.9												
100-D-77	J1N0J7	12/15/2011	151190.1	573273.5												
100-D-77	J1N0J8	12/15/2011	151196.9	573273.6												
100-D-77	J1N0J9	12/19/2011	151207.8	573263.9												
100-D-77	J1N0K0	12/19/2011	151214.4	573270.5												
100-D-77	J1N0K1	12/19/2011	151220.4	573267.2												
100-D-77	J1N0K2	12/19/2011	151219.6	573260.9												
100-D-77	J1N0K3	12/19/2011	151228.2	573265.3												
100-D-77	J1N1K4	1/3/2012	151222.4	573249.8												
100-D-77	J1N1K5	1/3/2012	151224.8	573252.4												
100-D-77	J1N1K6	1/3/2012	151229.6	573252.9												
100-D-77	J1N1K7	1/3/2012	151227.7	573258.1												
100-D-77	J1N1K8	1/3/2012	151221.6	573257.3												
100-D-77	J1N215	1/9/2012	151222.8	573248.9	0.15	U	0.15	0.91	U	0.91	0.055	B	0.038	6310	X	13
100-D-77	J1N216	1/9/2012	151221.8	573249	0.15	U	0.15	0.9	U	0.9	0.08	B	0.038	5750	X	13
100-D-77	J1N217	1/9/2012	151222.2	573249.6	0.17	U	0.17	1	U	1	0.042	U	0.042	5940	X	14.6
100-D-77	J1N218	1/9/2012	151224.4	573251.6	0.033	B	0.03	0.92	U	0.92	0.078	B	0.038	5800	X	13.2
100-D-77	J1N219	1/9/2012	151228.4	573254.8	0.033	U	0.03	0.99	U	0.99	0.084	B	0.042	5780	X	14.3
100-D-77	J1N220	1/9/2012	151225	573254.5	0.036	B	0.03	0.88	U	0.88	0.075	B	0.037	5810	X	12.7
100-D-77	J1N221	1/9/2012	151223.8	573258	0.15	U	0.15	0.9	U	0.9	0.066	B	0.038	5350	X	13
100-D-77	J1N222	1/9/2012	151183.7	573252.3	0.16	U	0.16	0.97	U	0.97	0.084	B	0.041	5660	X	14
100-D-77	J1N223	1/9/2012	151185	573255.3	0.032	U	0.03	0.95	U	0.95	0.1	B	0.04	7930	X	13.6
100-D-77	J1N224	1/9/2012	151186.4	573257.6	0.031	BM	0.03	0.89	U	0.89	0.13	BM	0.037	10900	X	12.7

Table B-2. 100-D-62, 100-D-77, 100-D-83:1 Waste Characterization and In-Process Samples - Metals. (7 Pages)

Location	HEIS Number	Sample Date	Northing	Easting	Chromium			Cobalt			Copper			Hexavalent Chromium		
					mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-D-62	J1H217	4/25/2011	151154	573256	211		0.07	8.8		0.12	79.1		0.26	2.86		0.155
100-D-62	J1H230	4/25/2011	151154	573256	540		0.15	8.3		0.26	102		0.55	0.154	U	0.154
100-D-62	J1HNK6	5/11/2011	151156	573256										0.155	U	0.155
100-D-62	J1HNK7	5/11/2011	151156	573256										0.155	U	0.155
100-D-77	J1H213	4/25/2011	151222	573248	16.9		0.06	7.5		0.11	22.1		0.23	0.42		0.155
100-D-77	J1H215	5/4/2011	151192	573258	13.8		0.06	7.8	X	0.099	20.8	X	0.21	1.65		0.155
100-D-77	J1H216	4/25/2011	151185	573239	59.7		0.06	5.5		0.11	61.4		0.24	2.38		0.154
100-D-77	J1J4W7	5/11/2011			61.9	N	0.06	0.11	U	0.11	4.2		0.24	7.7		0.153
100-D-77	J1JW09	6/16/2011	151224.8	573251.1										0.155	U	0.155
100-D-77	J1JW10	6/16/2011	151223.3	573253.2										0.155	U	0.155
100-D-77	J1K4D1	7/11/2011	151240.3	573255	7.2	X	0.05	6.9	X	0.088	15.3	X	0.19	0.155	U	0.155
100-D-77	J1K4D2	7/11/2011	151223.9	573255.5	12.1	X	0.07	6.6	X	0.12	17.6	X	0.26	0.155	U	0.155
100-D-77	J1K4D3	7/11/2011	151222.8	573249.6	11.8	X	0.06	5.4	X	0.099	42.4	X	0.21	0.155	U	0.155
100-D-77	J1K4D4	7/11/2011	151208.1	573251.7	10	X	0.05	6.5	X	0.085	15.1	X	0.18	0.155	U	0.155
100-D-77	J1K4D5	7/11/2011	151204.6	573266.2	7.8	X	0.06	7	X	0.11	17.7	X	0.24	0.155	U	0.155
100-D-77	J1K4D6	7/11/2011	151191.2	573260.1	41.3	X	0.05	7.5	X	0.087	23.7	X	0.19	0.943		0.155
100-D-77	J1K4D7	7/11/2011	151187.5	573233.9	9.4	X	0.06	6.8	X	0.1	17.4	X	0.22	0.155	U	0.155
100-D-77	J1K4D8	7/11/2011	151182.6	573251.6	12.5	X	0.05	6.9	X	0.092	20.2	X	0.2	0.811		0.155
100-D-77	J1K4D9	7/11/2011	151158.4	573257.6	8.5	X	0.05	7	X	0.088	16.8	X	0.19	0.155	U	0.155
100-D-77	J1K4F0	7/11/2011	151150.6	573254.9	10.5	X	0.05	6.6	X	0.092	16.6	X	0.2	0.155	U	0.155
100-D-77	J1K4H7	7/6/2011	151223	573251	9.1	X	0.06	6.8	X	0.1	21.3	X	0.22	0.432		0.155
100-D-77	J1K4H8	7/6/2011	151223	573250	3.2	X	0.06	1.4	X	0.11	3.5	X	0.23	0.652		0.155
100-D-77	J1K4H9	7/6/2011	151222	573247	1.5	X	0.06	3.3	X	0.11	5.3	X	0.23	0.155	U	0.155
100-D-77	J1N0H9	12/15/2011	151241	573250.8										0.155	U	0.155
100-D-77	J1N0J0	12/15/2011	151234.4	573242.7										0.155	U	0.155
100-D-77	J1N0J1	12/15/2011	151225	573240.9										0.155	U	0.155
100-D-77	J1N0J2	12/15/2011	151220	573235.7										0.155	U	0.155
100-D-77	J1N0J3	12/15/2011	151212.7	573241.7										0.155	U	0.155
100-D-77	J1N0J4	12/15/2011	151180.1	573277.6										0.155	U	0.155
100-D-77	J1N0J5	12/15/2011	151184.4	573278.4										0.155	U	0.155
100-D-77	J1N0J6	12/15/2011	151186.1	573273.9										0.155	U	0.155
100-D-77	J1N0J7	12/15/2011	151190.1	573273.5										0.155	U	0.155
100-D-77	J1N0J8	12/15/2011	151196.9	573273.6										0.155	U	0.155
100-D-77	J1N0J9	12/19/2011	151207.8	573263.9										0.155	U	0.155
100-D-77	J1N0K0	12/19/2011	151214.4	573270.5										0.155	U	0.155
100-D-77	J1N0K1	12/19/2011	151220.4	573267.2										0.155	U	0.155
100-D-77	J1N0K2	12/19/2011	151219.6	573260.9										0.155	U	0.155
100-D-77	J1N0K3	12/19/2011	151228.2	573265.3										0.155	U	0.155
100-D-77	J1N1K4	1/3/2012	151222.4	573249.8										0.155	U	0.155
100-D-77	J1N1K5	1/3/2012	151224.8	573252.4										0.219		0.155
100-D-77	J1N1K6	1/3/2012	151229.6	573252.9										0.155	U	0.155
100-D-77	J1N1K7	1/3/2012	151227.7	573258.1										0.155	U	0.155
100-D-77	J1N1K8	1/3/2012	151221.6	573257.3										0.155	U	0.155
100-D-77	J1N215	1/9/2012	151222.8	573248.9	4.3	X	0.05	6.5	X	0.46	8.6	X	0.2	0.155	U	0.155
100-D-77	J1N216	1/9/2012	151221.8	573249	5.1	X	0.05	9.4	X	0.46	13.8	X	0.2	0.155	U	0.155
100-D-77	J1N217	1/9/2012	151222.2	573249.6	3.9	X	0.06	6.8	X	0.52	10.8	X	0.22	0.155	U	0.155
100-D-77	J1N218	1/9/2012	151224.4	573251.6	3.7	X	0.05	9	X	0.094	13.7	X	0.2	0.155	U	0.155
100-D-77	J1N219	1/9/2012	151228.4	573254.8	4.7	X	0.06	9.9	X	0.1	13.5	X	0.22	0.155	U	0.155
100-D-77	J1N220	1/9/2012	151225	573254.5	4.2	X	0.05	8.7	X	0.09	14.4	X	0.2	0.155	U	0.155
100-D-77	J1N221	1/9/2012	151223.8	573258	3.8	X	0.05	11	X	0.46	14.1	X	0.2	0.155	U	0.155
100-D-77	J1N222	1/9/2012	151183.7	573252.3	3.7	X	0.06	10.8	X	0.5	12.6	X	0.22	0.155	U	0.155
100-D-77	J1N223	1/9/2012	151185	573255.3	5.3	X	0.06	9.5	X	0.097	13.9	X	0.21	0.155	U	0.155
100-D-77	J1N224	1/9/2012	151186.4	573257.6	7.2	X	0.05	9.2	X	0.09	13.7	X	0.2	0.155	U	0.155

Table B-2. 100-D-62, 100-D-77, 100-D-83:1 Waste Characterization and In-Process Samples - Metals. (7 Pages)

Location	HEIS Number	Sample Date	Northing	Easting	Iron			Lead			Magnesium			Manganese		
					mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-D-62	J1H217	4/25/2011	151154	573256	22900		4.6	97.1		0.33	4710		4.5	343		0.12
100-D-62	J1H230	4/25/2011	151154	573256	20300	M	9.7	114		0.69	3970		9.4	272		0.26
100-D-62	J1HNK6	5/11/2011	151156	573256												
100-D-62	J1HNK7	5/11/2011	151156	573256												
100-D-77	J1H213	4/25/2011	151222	573248	25700		4	7.1		0.29	3970		3.9	260		0.11
100-D-77	J1H215	5/4/2011	151192	573258	21200	X	3.8	32.5	X	0.27	4220	X	3.7	315	X	0.099
100-D-77	J1H216	4/25/2011	151185	573239	22700		4.1	12200		0.29	2430		4	250		0.11
100-D-77	J1J4W7	5/11/2011			4960		4.1	177		0.29	58.7		4	6.4	M	0.11
100-D-77	J1JW09	6/16/2011	151224.8	573251.1												
100-D-77	J1JW10	6/16/2011	151223.3	573253.2												
100-D-77	J1K4D1	7/11/2011	151240.3	573255	20200	X	3.3	3.3		0.24	3830	X	3.3	297	X	0.088
100-D-77	J1K4D2	7/11/2011	151223.9	573255.5	19500	X	4.6	7.3		0.32	4460	X	4.5	284	X	0.12
100-D-77	J1K4D3	7/11/2011	151222.8	573249.6	16000	X	3.8	6.7		0.27	3790	X	3.7	244	X	0.099
100-D-77	J1K4D4	7/11/2011	151208.1	573251.7	19600	X	3.2	5.2		0.23	4150	X	3.1	275	X	0.085
100-D-77	J1K4D5	7/11/2011	151204.6	573266.2	22400	X	4.2	15		0.3	4210	X	4.1	287	X	0.11
100-D-77	J1K4D6	7/11/2011	151191.2	573260.1	23600	X	3.3	89.7		0.23	4610	X	3.2	324	X	0.087
100-D-77	J1K4D7	7/11/2011	151187.5	573233.9	19400	X	3.8	2.8		0.27	4190	X	3.7	264	X	0.1
100-D-77	J1K4D8	7/11/2011	151182.6	573251.6	21500	X	3.5	21.5		0.25	3980	X	3.4	263	X	0.092
100-D-77	J1K4D9	7/11/2011	151158.4	573257.6	20400	X	3.4	7.5		0.24	4360	X	3.3	295	X	0.088
100-D-77	J1K4F0	7/11/2011	151150.6	573254.9	18800	X	3.5	5.5		0.25	4090	X	3.4	278	X	0.092
100-D-77	J1K4H7	7/6/2011	151223	573251	27700	X	3.8	2.6		0.27	2730	X	3.7	199	X	0.1
100-D-77	J1K4H8	7/6/2011	151223	573250	24300	X	4	3		0.29	415	X	3.9	37.3	X	0.11
100-D-77	J1K4H9	7/6/2011	151222	573247	6940	X	4	4.3		0.28	1520	X	3.9	72.1	X	0.11
100-D-77	J1N0H9	12/15/2011	151241	573250.8												
100-D-77	J1N0J0	12/15/2011	151234.4	573242.7												
100-D-77	J1N0J1	12/15/2011	151225	573240.9												
100-D-77	J1N0J2	12/15/2011	151220	573235.7												
100-D-77	J1N0J3	12/15/2011	151212.7	573241.7												
100-D-77	J1N0J4	12/15/2011	151180.1	573277.6												
100-D-77	J1N0J5	12/15/2011	151184.4	573278.4												
100-D-77	J1N0J6	12/15/2011	151186.1	573273.9												
100-D-77	J1N0J7	12/15/2011	151190.1	573273.5												
100-D-77	J1N0J8	12/15/2011	151196.9	573273.6												
100-D-77	J1N0J9	12/19/2011	151207.8	573263.9												
100-D-77	J1N0K0	12/19/2011	151214.4	573270.5												
100-D-77	J1N0K1	12/19/2011	151220.4	573267.2												
100-D-77	J1N0K2	12/19/2011	151219.6	573260.9												
100-D-77	J1N0K3	12/19/2011	151228.2	573265.3												
100-D-77	J1N1K4	1/3/2012	151222.4	573249.8												
100-D-77	J1N1K5	1/3/2012	151224.8	573252.4												
100-D-77	J1N1K6	1/3/2012	151229.6	573252.9												
100-D-77	J1N1K7	1/3/2012	151227.7	573258.1												
100-D-77	J1N1K8	1/3/2012	151221.6	573257.3												
100-D-77	J1N215	1/9/2012	151222.8	573248.9	32500	X	3.5	2.2	B	1.2	1910	X	3.4	159	X	0.092
100-D-77	J1N216	1/9/2012	151221.8	573249	28600	X	3.5	2.9		1.2	3380	X	3.4	229	X	0.092
100-D-77	J1N217	1/9/2012	151222.2	573249.6	28900	X	3.9	3.1		1.4	2200	X	3.8	172	X	0.1
100-D-77	J1N218	1/9/2012	151224.4	573251.6	21900	X	3.6	1.9		0.25	3660	X	3.5	273	X	0.094
100-D-77	J1N219	1/9/2012	151228.4	573254.8	23600	X	3.9	2.3		0.27	4050	X	3.7	313	X	0.1
100-D-77	J1N220	1/9/2012	151225	573254.5	21500	X	3.4	2.1		0.24	3940	X	3.3	268	X	0.09
100-D-77	J1N221	1/9/2012	151223.8	573258	23300	X	3.5	3		1.2	4230	X	3.4	287	X	0.092
100-D-77	J1N222	1/9/2012	151183.7	573252.3	24600	X	3.8	2.9		1.3	4040	X	3.7	288	X	0.099
100-D-77	J1N223	1/9/2012	151185	573255.3	24200	X	3.7	4.8		0.26	4280	X	3.6	282	X	0.097
100-D-77	J1N224	1/9/2012	151186.4	573257.6	23800	X	3.4	7.9		0.24	4250	X	3.3	292	X	0.09

Table B-2. 100-D-62, 100-D-77, 100-D-83:1 Waste Characterization and In-Process Samples - Metals. (7 Pages)

Location	HEIS Number	Sample Date	Northing	Easting	Mercury			Molybdenum			Nickel			Potassium		
					mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-D-62	J1H217	4/25/2011	151154	573256	23.9		0.61	4.4		0.32	16.4		0.15	1620		49.9
100-D-62	J1H230	4/25/2011	151154	573256	14.3	M	0.15	4.8	B	0.66	16		0.31	1490		105
100-D-62	J1HNK6	5/11/2011	151156	573256												
100-D-62	J1HNK7	5/11/2011	151156	573256												
100-D-77	J1H213	4/25/2011	151222	573248	0.052	M	0.01	0.27	U	0.27	9.7		0.13	949		43.3
100-D-77	J1H215	5/4/2011	151192	573258	2.6		0.06	0.82	BM	0.26	10.6	X	0.12	979		40.5
100-D-77	J1H216	4/25/2011	151185	573239	2		0.06	3.9		0.28	16.5		0.13	647		44.7
100-D-77	J1J4W7	5/11/2011			211	M	7	1.8	B	0.28	0.89	B	0.13	81.6	B	44.8
100-D-77	J1JW09	6/16/2011	151224.8	573251.1												
100-D-77	J1JW10	6/16/2011	151223.3	573253.2												
100-D-77	J1K4D1	7/11/2011	151240.3	573255	0.14		0.01	0.62	B	0.23	8.6	X	0.11	733		36.1
100-D-77	J1K4D2	7/11/2011	151223.9	573255.5	0.19		0.01	0.31	U	0.31	10.2	X	0.15	1110		49.3
100-D-77	J1K4D3	7/11/2011	151222.8	573249.6	0.78		0.01	0.26	U	0.26	10.4	X	0.12	970		40.5
100-D-77	J1K4D4	7/11/2011	151208.1	573251.7	0.09		0.01	0.22	U	0.22	10.9	X	0.1	905		34.7
100-D-77	J1K4D5	7/11/2011	151204.6	573266.2	0.14		0.01	0.29	U	0.29	8.9	X	0.14	934		45.6
100-D-77	J1K4D6	7/11/2011	151191.2	573260.1	7.2		0.11	0.43	B	0.23	12.5	X	0.11	1030		35.5
100-D-77	J1K4D7	7/11/2011	151187.5	573233.9	0.0088	B	0.01	0.26	U	0.26	10.3	X	0.12	883		40.9
100-D-77	J1K4D8	7/11/2011	151182.6	573251.6	0.48		0.01	0.37	B	0.24	10.8	X	0.11	767		37.7
100-D-77	J1K4D9	7/11/2011	151158.4	573257.6	0.028		0.01	0.23	U	0.23	10.1	X	0.11	989		36.2
100-D-77	J1K4F0	7/11/2011	151150.6	573254.9	0.15		0.01	0.24	U	0.24	9.9	X	0.11	1070		37.6
100-D-77	J1K4H7	7/6/2011	151223	573251	0.012	BN	0.01	0.36	B	0.26	5.6		0.12	760		41.1
100-D-77	J1K4H8	7/6/2011	151223	573250	0.68		0.01	0.28	U	0.28	0.63	B	0.13	1550		43.7
100-D-77	J1K4H9	7/6/2011	151222	573247	43.3		0.58	0.27	U	0.27	2.4	B	0.13	437		43.2
100-D-77	J1N0H9	12/15/2011	151241	573250.8												
100-D-77	J1N0J0	12/15/2011	151234.4	573242.7												
100-D-77	J1N0J1	12/15/2011	151225	573240.9												
100-D-77	J1N0J2	12/15/2011	151220	573235.7												
100-D-77	J1N0J3	12/15/2011	151212.7	573241.7												
100-D-77	J1N0J4	12/15/2011	151180.1	573277.6												
100-D-77	J1N0J5	12/15/2011	151184.4	573278.4												
100-D-77	J1N0J6	12/15/2011	151186.1	573273.9												
100-D-77	J1N0J7	12/15/2011	151190.1	573273.5												
100-D-77	J1N0J8	12/15/2011	151196.9	573273.6												
100-D-77	J1N0J9	12/19/2011	151207.8	573263.9												
100-D-77	J1N0K0	12/19/2011	151214.4	573270.5												
100-D-77	J1N0K1	12/19/2011	151220.4	573267.2												
100-D-77	J1N0K2	12/19/2011	151219.6	573260.9												
100-D-77	J1N0K3	12/19/2011	151228.2	573265.3												
100-D-77	J1N1K4	1/3/2012	151222.4	573249.8												
100-D-77	J1N1K5	1/3/2012	151224.8	573252.4												
100-D-77	J1N1K6	1/3/2012	151229.6	573252.9												
100-D-77	J1N1K7	1/3/2012	151227.7	573258.1												
100-D-77	J1N1K8	1/3/2012	151221.6	573257.3												
100-D-77	J1N215	1/9/2012	151222.8	573248.9	0.0069	U	0.01	0.34	B	0.24	4.4	X	0.11	745		37.9
100-D-77	J1N216	1/9/2012	151221.8	573249	0.0071	U	0.01	0.24	U	0.24	6.9	X	0.11	504		37.8
100-D-77	J1N217	1/9/2012	151222.2	573249.6	0.0059	U	0.01	0.27	U	0.27	4.9	X	0.13	599		42.3
100-D-77	J1N218	1/9/2012	151224.4	573251.6	0.0052	U	0.01	0.24	U	0.24	8.2	X	0.12	403		38.5
100-D-77	J1N219	1/9/2012	151228.4	573254.8	0.0053	U	0.01	0.26	U	0.26	8.7	X	0.12	448		41.5
100-D-77	J1N220	1/9/2012	151225	573254.5	0.0056	U	0.01	0.23	U	0.23	10.3	X	0.11	447		36.9
100-D-77	J1N221	1/9/2012	151223.8	573258	0.005	U	0.01	0.27	B	0.24	10.7	X	0.11	420		37.7
100-D-77	J1N222	1/9/2012	151183.7	573252.3	0.0056	U	0.01	0.26	U	0.26	7.9	X	0.12	476		40.7
100-D-77	J1N223	1/9/2012	151185	573255.3	0.11		0.01	0.25	U	0.25	8.8	X	0.12	601		39.6
100-D-77	J1N224	1/9/2012	151186.4	573257.6	0.17		0.01	0.23	U	0.23	9.5	X	0.11	630		37.1

Table B-2. 100-D-62, 100-D-77, 100-D-83:1 Waste Characterization and In-Process Samples - Metals. (7 Pages)

Location	HEIS Number	Sample Date	Northing	Easting	Selenium			Silicon			Silver			Sodium		
					mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
100-D-62	J1H217	4/25/2011	151154	573256	1	U	1	293		6.9	3.2		0.19	600		71.8
100-D-62	J1H230	4/25/2011	151154	573256	2.2	U	2.2	873	MN	14.4	4.4	N	0.41	1440		151
100-D-62	J1HNK6	5/11/2011	151156	573256												
100-D-62	J1HNK7	5/11/2011	151156	573256												
100-D-77	J1H213	4/25/2011	151222	573248	0.91	U	0.91	288		6	0.17	U	0.17	308		62.3
100-D-77	J1H215	5/4/2011	151192	573258	1.3		0.85	178	N	5.6	0.16	U	0.16	589		58.2
100-D-77	J1H216	4/25/2011	151185	573239	0.94	U	0.94	229		6.2	1.2		0.17	198		64.3
100-D-77	J1J4W7	5/11/2011			0.94	U	0.94	228	N	6.2	0.32		0.17	98	B	64.4
100-D-77	J1JW09	6/16/2011	151224.8	573251.1												
100-D-77	J1JW10	6/16/2011	151223.3	573253.2												
100-D-77	J1K4D1	7/11/2011	151240.3	573255	1		0.76	307	XN	5	0.14	U	0.14	275		51.9
100-D-77	J1K4D2	7/11/2011	151223.9	573255.5	1	U	1	471	X	6.8	0.19	U	0.19	336		71
100-D-77	J1K4D3	7/11/2011	151222.8	573249.6	0.85	U	0.85	409	X	5.6	0.16	U	0.16	240		58.3
100-D-77	J1K4D4	7/11/2011	151208.1	573251.7	0.73	U	0.73	376	X	4.8	0.14	U	0.14	239		50
100-D-77	J1K4D5	7/11/2011	151204.6	573266.2	0.96	U	0.96	419	X	6.3	0.18	U	0.18	389		65.6
100-D-77	J1K4D6	7/11/2011	151191.2	573260.1	0.75	U	0.75	335	X	4.9	0.14	U	0.14	552		51.2
100-D-77	J1K4D7	7/11/2011	151187.5	573233.9	0.86	U	0.86	359	X	5.6	0.16	U	0.16	470		58.8
100-D-77	J1K4D8	7/11/2011	151182.6	573251.6	0.79	U	0.79	186	X	5.2	0.15	U	0.15	499		54.2
100-D-77	J1K4D9	7/11/2011	151158.4	573257.6	0.76	U	0.76	330	X	5	0.14	U	0.14	269		52.1
100-D-77	J1K4F0	7/11/2011	151150.6	573254.9	0.79	U	0.79	353	X	5.2	0.15	U	0.15	287		54.1
100-D-77	J1K4H7	7/6/2011	151223	573251	0.86	U	0.86	127	N	5.7	0.16	U	0.16	464		59.1
100-D-77	J1K4H8	7/6/2011	151223	573250	0.92	U	0.92	199		6	0.17	U	0.17	2850		62.8
100-D-77	J1K4H9	7/6/2011	151222	573247	0.91	U	0.91	178		6	0.17	U	0.17	427		62.2
100-D-77	J1N0H9	12/15/2011	151241	573250.8												
100-D-77	J1N0J0	12/15/2011	151234.4	573242.7												
100-D-77	J1N0J1	12/15/2011	151225	573240.9												
100-D-77	J1N0J2	12/15/2011	151220	573235.7												
100-D-77	J1N0J3	12/15/2011	151212.7	573241.7												
100-D-77	J1N0J4	12/15/2011	151180.1	573277.6												
100-D-77	J1N0J5	12/15/2011	151184.4	573278.4												
100-D-77	J1N0J6	12/15/2011	151186.1	573273.9												
100-D-77	J1N0J7	12/15/2011	151190.1	573273.5												
100-D-77	J1N0J8	12/15/2011	151196.9	573273.6												
100-D-77	J1N0J9	12/19/2011	151207.8	573263.9												
100-D-77	J1N0K0	12/19/2011	151214.4	573270.5												
100-D-77	J1N0K1	12/19/2011	151220.4	573267.2												
100-D-77	J1N0K2	12/19/2011	151219.6	573260.9												
100-D-77	J1N0K3	12/19/2011	151228.2	573265.3												
100-D-77	J1N1K4	1/3/2012	151222.4	573249.8												
100-D-77	J1N1K5	1/3/2012	151224.8	573252.4												
100-D-77	J1N1K6	1/3/2012	151229.6	573252.9												
100-D-77	J1N1K7	1/3/2012	151227.7	573258.1												
100-D-77	J1N1K8	1/3/2012	151221.6	573257.3												
100-D-77	J1N215	1/9/2012	151222.8	573248.9	0.79	U	0.79	107		5.2	0.15	UN	0.15	1720		54.5
100-D-77	J1N216	1/9/2012	151221.8	573249	0.79	U	0.79	117		5.2	0.15	UN	0.15	445		54.4
100-D-77	J1N217	1/9/2012	151222.2	573249.6	0.89	U	0.89	110		5.8	0.17	UN	0.17	1420		60.9
100-D-77	J1N218	1/9/2012	151224.4	573251.6	0.81	U	0.81	104		5.3	0.15	UN	0.15	294		55.4
100-D-77	J1N219	1/9/2012	151228.4	573254.8	0.87	U	0.87	103		5.7	0.16	UN	0.16	265		59.8
100-D-77	J1N220	1/9/2012	151225	573254.5	0.77	U	0.77	97.9		5.1	0.14	UN	0.14	351		53.1
100-D-77	J1N221	1/9/2012	151223.8	573258	0.79	U	0.79	80.9		5.2	0.15	UN	0.15	311		54.3
100-D-77	J1N222	1/9/2012	151183.7	573252.3	0.85	U	0.85	109		5.6	0.16	UN	0.16	365		58.5
100-D-77	J1N223	1/9/2012	151185	573255.3	0.83	U	0.83	159		5.5	0.15	UN	0.15	325		57
100-D-77	J1N224	1/9/2012	151186.4	573257.6	0.78	U	0.78	227	N	5.1	0.14	UN	0.14	350		53.3

Table B-2. 100-D-62, 100-D-77, 100-D-83:1 Waste Characterization and In-Process Samples - Metals. (7 Pages)

Location	HEIS Number	Sample Date	Northing	Easting	Vanadium			Zinc		
					mg/kg	Q	PQL	mg/kg	Q	PQL
100-D-62	J1H217	4/25/2011	151154	573256	49.3		0.11	1400	X	0.48
100-D-62	J1H230	4/25/2011	151154	573256	44.4		0.24	1710		1
100-D-62	J1HNK6	5/11/2011	151156	573256						
100-D-62	J1HNK7	5/11/2011	151156	573256						
100-D-77	J1H213	4/25/2011	151222	573248	64.3		0.1	47	X	0.42
100-D-77	J1H215	5/4/2011	151192	573258	53.7		0.09	128	XMN	0.39
100-D-77	J1H216	4/25/2011	151185	573239	73.2		0.1	291	X	0.43
100-D-77	J1J4W7	5/11/2011			46.6		0.1	29.8		0.43
100-D-77	J1JW09	6/16/2011	151224.8	573251.1						
100-D-77	J1JW10	6/16/2011	151223.3	573253.2						
100-D-77	J1K4D1	7/11/2011	151240.3	573255	48.8	X	0.08	36.4	X	0.35
100-D-77	J1K4D2	7/11/2011	151223.9	573255.5	47.5	X	0.11	43.4	X	0.48
100-D-77	J1K4D3	7/11/2011	151222.8	573249.6	39.6	X	0.09	38.3	X	0.39
100-D-77	J1K4D4	7/11/2011	151208.1	573251.7	49	X	0.08	38	X	0.34
100-D-77	J1K4D5	7/11/2011	151204.6	573266.2	54.3	X	0.1	71.2	X	0.44
100-D-77	J1K4D6	7/11/2011	151191.2	573260.1	57.9	X	0.08	256	X	0.35
100-D-77	J1K4D7	7/11/2011	151187.5	573233.9	43.6	X	0.09	35.8	X	0.4
100-D-77	J1K4D8	7/11/2011	151182.6	573251.6	56.2	X	0.09	86.8	X	0.37
100-D-77	J1K4D9	7/11/2011	151158.4	573257.6	47.4	X	0.08	41.5	X	0.35
100-D-77	J1K4F0	7/11/2011	151150.6	573254.9	47.1	X	0.09	48.8	X	0.36
100-D-77	J1K4H7	7/6/2011	151223	573251	67.5	X	0.09	38.6	X	0.4
100-D-77	J1K4H8	7/6/2011	151223	573250	31.6	X	0.1	5.2	X	0.42
100-D-77	J1K4H9	7/6/2011	151222	573247	18.2	X	0.1	16.1	X	0.42
100-D-77	J1N0H9	12/15/2011	151241	573250.8						
100-D-77	J1N0J0	12/15/2011	151234.4	573242.7						
100-D-77	J1N0J1	12/15/2011	151225	573240.9						
100-D-77	J1N0J2	12/15/2011	151220	573235.7						
100-D-77	J1N0J3	12/15/2011	151212.7	573241.7						
100-D-77	J1N0J4	12/15/2011	151180.1	573277.6						
100-D-77	J1N0J5	12/15/2011	151184.4	573278.4						
100-D-77	J1N0J6	12/15/2011	151186.1	573273.9						
100-D-77	J1N0J7	12/15/2011	151190.1	573273.5						
100-D-77	J1N0J8	12/15/2011	151196.9	573273.6						
100-D-77	J1N0J9	12/19/2011	151207.8	573263.9						
100-D-77	J1N0K0	12/19/2011	151214.4	573270.5						
100-D-77	J1N0K1	12/19/2011	151220.4	573267.2						
100-D-77	J1N0K2	12/19/2011	151219.6	573260.9						
100-D-77	J1N0K3	12/19/2011	151228.2	573265.3						
100-D-77	J1N1K4	1/3/2012	151222.4	573249.8						
100-D-77	J1N1K5	1/3/2012	151224.8	573252.4						
100-D-77	J1N1K6	1/3/2012	151229.6	573252.9						
100-D-77	J1N1K7	1/3/2012	151227.7	573258.1						
100-D-77	J1N1K8	1/3/2012	151221.6	573257.3						
100-D-77	J1N215	1/9/2012	151222.8	573248.9	88.3	X	0.43	32.3	X	0.37
100-D-77	J1N216	1/9/2012	151221.8	573249	106	X	0.43	42.6	X	0.37
100-D-77	J1N217	1/9/2012	151222.2	573249.6	91.7	X	0.49	32.9	X	0.41
100-D-77	J1N218	1/9/2012	151224.4	573251.6	60.1	X	0.09	40.8	X	0.37
100-D-77	J1N219	1/9/2012	151228.4	573254.8	63.1	X	0.1	41.5	X	0.4
100-D-77	J1N220	1/9/2012	151225	573254.5	65.2	X	0.09	37.4	X	0.36
100-D-77	J1N221	1/9/2012	151223.8	573258	71.2	X	0.43	39.4	X	0.37
100-D-77	J1N222	1/9/2012	151183.7	573252.3	77.7	X	0.47	42.9	X	0.39
100-D-77	J1N223	1/9/2012	151185	573255.3	64.2	X	0.09	45.5	X	0.38
100-D-77	J1N224	1/9/2012	151186.4	573257.6	63.7	X	0.09	55.4	XN	0.36

Table B-3. 100-D-62, 100-D-77, 100-D-83:1 Waste Characterization and In-Process Samples - Radionuclides. (2 pages)

LOCATION	HEIS Number	Sample Date	Northing	Easting	Americium-241			Cesium-137			Cobalt-60			Europium-152		
					pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
100-D-62	J1H217	4/25/2011	151154	573256												
100-D-62	J1H230	4/25/2011	151154	573256												
100-D-62	J1HNK6	5/11/2011	151156	573256												
100-D-62	J1HNK7	5/11/2011	151156	573256												
100-D-77	J1H213	4/25/2011	151222	573248												
100-D-77	J1H215	5/4/2011	151192	573258												
100-D-77	J1H216	4/25/2011	151185	573239												
100-D-77	J1J4W7	5/11/2011														
100-D-77	J1JW09	6/16/2011	151224.8	573251.1												
100-D-77	J1JW10	6/16/2011	151223.3	573253.2												
100-D-77	J1K4D1	7/11/2011	151240.3	573255												
100-D-77	J1K4D2	7/11/2011	151223.9	573255.5												
100-D-77	J1K4D3	7/11/2011	151222.8	573249.6												
100-D-77	J1K4D4	7/11/2011	151208.1	573251.7												
100-D-77	J1K4D5	7/11/2011	151204.6	573266.2												
100-D-77	J1K4D6	7/11/2011	151191.2	573260.1												
100-D-77	J1K4D7	7/11/2011	151187.5	573233.9												
100-D-77	J1K4D8	7/11/2011	151182.6	573251.6												
100-D-77	J1K4D9	7/11/2011	151158.4	573257.6												
100-D-77	J1K4F0	7/11/2011	151150.6	573254.9												
100-D-77	J1K4H7	7/6/2011	151223	573251												
100-D-77	J1K4H8	7/6/2011	151223	573250												
100-D-77	J1K4H9	7/6/2011	151222	573247												
100-D-77	J1N0H9	12/15/2011	151241	573250.8												
100-D-77	J1N0J0	12/15/2011	151234.4	573242.7												
100-D-77	J1N0J1	12/15/2011	151225	573240.9												
100-D-77	J1N0J2	12/15/2011	151220	573235.7												
100-D-77	J1N0J3	12/15/2011	151212.7	573241.7												
100-D-77	J1N0J4	12/15/2011	151180.1	573277.6												
100-D-77	J1N0J5	12/15/2011	151184.4	573278.4												
100-D-77	J1N0J6	12/15/2011	151186.1	573273.9												
100-D-77	J1N0J7	12/15/2011	151190.1	573273.5												
100-D-77	J1N0J8	12/15/2011	151196.9	573273.6												
100-D-77	J1N0J9	12/19/2011	151207.8	573263.9												
100-D-77	J1N0K0	12/19/2011	151214.4	573270.5												
100-D-77	J1N0K1	12/19/2011	151220.4	573267.2												
100-D-77	J1N0K2	12/19/2011	151219.6	573260.9												
100-D-77	J1N0K3	12/19/2011	151228.2	573265.3												
100-D-77	J1N1K4	1/3/2012	151222.4	573249.8												
100-D-77	J1N1K5	1/3/2012	151224.8	573252.4												
100-D-77	J1N1K6	1/3/2012	151229.6	573252.9												
100-D-77	J1N1K7	1/3/2012	151227.7	573258.1												
100-D-77	J1N1K8	1/3/2012	151221.6	573257.3												
100-D-77	J1N215	1/9/2012	151222.8	573248.9	0.0183	U	0.238	0.0043	U	0.025	0.00225	U	0.031	-0.0247	U	0.063
100-D-77	J1N216	1/9/2012	151221.8	573249	-0.0137	U	0.121	-0.0105	U	0.027	0.0123	U	0.028	0.0087	U	0.076
100-D-77	J1N217	1/9/2012	151222.2	573249.6	0.0285	U	0.108	-0.0146	U	0.03	-0.0141	U	0.034	0.0506	U	0.091
100-D-77	J1N218	1/9/2012	151224.4	573251.6	-0.0183	U	0.057	-0.0153	U	0.034	0.00417	U	0.035	0.0338	U	0.095
100-D-77	J1N219	1/9/2012	151228.4	573254.8	-0.0355	U	0.122	0.0021	U	0.022	0.0122	U	0.025	-0.0183	U	0.049
100-D-77	J1N220	1/9/2012	151225	573254.5	-0.0199	U	0.097	-0.0158	U	0.028	0.00176	U	0.035	0.0425	U	0.085
100-D-77	J1N221	1/9/2012	151223.8	573258	-0.0203	U	0.058	0.01	U	0.038	-0.0106	U	0.034	0.0071	U	0.096
100-D-77	J1N222	1/9/2012	151183.7	573252.3	-0.0017	U	0.128	0.0073	U	0.021	0.00157	U	0.022	0.0064	U	0.05
100-D-77	J1N223	1/9/2012	151185	573255.3	-0.0622	U	0.212	0.0055	U	0.025	-0.00059	U	0.025	0.0089	U	0.058
100-D-77	J1N224	1/9/2012	151186.4	573257.6	-0.0258	U	0.114	0.0059	U	0.026	-0.00876	U	0.02	0.0291	U	0.07

Table B-3. 100-D-62, 100-D-77, 100-D-83:1 Waste Characterization and In-Process Samples - Radionuclides. (2 pages)

LOCATION	HEIS Number	Sample Date	Northing	Easting	Europium-154			Europium-155			Silver-108m		
					pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
100-D-62	J1H217	4/25/2011	151154	573256									
100-D-62	J1H230	4/25/2011	151154	573256									
100-D-62	J1HNK6	5/11/2011	151156	573256									
100-D-62	J1HNK7	5/11/2011	151156	573256									
100-D-77	J1H213	4/25/2011	151222	573248									
100-D-77	J1H215	5/4/2011	151192	573258									
100-D-77	J1H216	4/25/2011	151185	573239									
100-D-77	J1J4W7	5/11/2011											
100-D-77	J1JW09	6/16/2011	151224.8	573251.1									
100-D-77	J1JW10	6/16/2011	151223.3	573253.2									
100-D-77	J1K4D1	7/11/2011	151240.3	573255									
100-D-77	J1K4D2	7/11/2011	151223.9	573255.5									
100-D-77	J1K4D3	7/11/2011	151222.8	573249.6									
100-D-77	J1K4D4	7/11/2011	151208.1	573251.7									
100-D-77	J1K4D5	7/11/2011	151204.6	573266.2									
100-D-77	J1K4D6	7/11/2011	151191.2	573260.1									
100-D-77	J1K4D7	7/11/2011	151187.5	573233.9									
100-D-77	J1K4D8	7/11/2011	151182.6	573251.6									
100-D-77	J1K4D9	7/11/2011	151158.4	573257.6									
100-D-77	J1K4F0	7/11/2011	151150.6	573254.9									
100-D-77	J1K4H7	7/6/2011	151223	573251									
100-D-77	J1K4H8	7/6/2011	151223	573250									
100-D-77	J1K4H9	7/6/2011	151222	573247									
100-D-77	J1N0H9	12/15/2011	151241	573250.8									
100-D-77	J1N0J0	12/15/2011	151234.4	573242.7									
100-D-77	J1N0J1	12/15/2011	151225	573240.9									
100-D-77	J1N0J2	12/15/2011	151220	573235.7									
100-D-77	J1N0J3	12/15/2011	151212.7	573241.7									
100-D-77	J1N0J4	12/15/2011	151180.1	573277.6									
100-D-77	J1N0J5	12/15/2011	151184.4	573278.4									
100-D-77	J1N0J6	12/15/2011	151186.1	573273.9									
100-D-77	J1N0J7	12/15/2011	151190.1	573273.5									
100-D-77	J1N0J8	12/15/2011	151196.9	573273.6									
100-D-77	J1N0J9	12/19/2011	151207.8	573263.9									
100-D-77	J1N0K0	12/19/2011	151214.4	573270.5									
100-D-77	J1N0K1	12/19/2011	151220.4	573267.2									
100-D-77	J1N0K2	12/19/2011	151219.6	573260.9									
100-D-77	J1N0K3	12/19/2011	151228.2	573265.3									
100-D-77	J1N1K4	1/3/2012	151222.4	573249.8									
100-D-77	J1N1K5	1/3/2012	151224.8	573252.4									
100-D-77	J1N1K6	1/3/2012	151229.6	573252.9									
100-D-77	J1N1K7	1/3/2012	151227.7	573258.1									
100-D-77	J1N1K8	1/3/2012	151221.6	573257.3									
100-D-77	J1N215	1/9/2012	151222.8	573248.9	-0.015	U	0.083	0.0217	U	0.078	-0.00021	U	0.02
100-D-77	J1N216	1/9/2012	151221.8	573249	-0.0559	U	0.079	-0.0031	U	0.087	-0.00643	U	0.022
100-D-77	J1N217	1/9/2012	151222.2	573249.6	0.0351	U	0.116	0.0686	U	0.084	-0.00864	U	0.025
100-D-77	J1N218	1/9/2012	151224.4	573251.6	-0.0475	U	0.11	0.0369	U	0.086	-0.00925	U	0.028
100-D-77	J1N219	1/9/2012	151228.4	573254.8	-0.0064	U	0.073	-0.0164	U	0.055	0.000118	U	0.016
100-D-77	J1N220	1/9/2012	151225	573254.5	0.00893	U	0.098	0.033	U	0.078	0.0116	U	0.026
100-D-77	J1N221	1/9/2012	151223.8	573258	0.0352	U	0.119	0.0066	U	0.084	-0.0214	U	0.027
100-D-77	J1N222	1/9/2012	151183.7	573252.3	0.0166	U	0.07	0.0297	U	0.058	0.000699	U	0.015
100-D-77	J1N223	1/9/2012	151185	573255.3	0.0148	U	0.087	0.0128	U	0.073	0.000256	U	0.019
100-D-77	J1N224	1/9/2012	151186.4	573257.6	-0.0173	U	0.067	-0.0212	U	0.074	-0.00143	U	0.021

Table B-4. 100-D-62, 100-D-77, 100-D-83:1 Waste Characterization and In-Process Samples - Organics. (4 pages)

CONSTITUENT	CLASS	J1H213 100-D-77 N151222, E573248 4/25/2011			J1H215 100-D-77 N151192, E573258 5/4/2011			J1H216 100-D-77 N151185, E573239 4/25/2011		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	2.8	U	2.8	110	UD	110	3.2	U	3.2
Aroclor-1221	PCB	8.2	U	8.2	330	UD	330	9.3	U	9.3
Aroclor-1232	PCB	2	U	2	82	UD	82	2.3	U	2.3
Aroclor-1242	PCB	4.7	U	4.7	190	UD	190	5.4	U	5.4
Aroclor-1248	PCB	4.7	U	4.7	190	UD	190	5.4	U	5.4
Aroclor-1254	PCB	2.6	U	2.6	110	UD	110	42	P	3
Aroclor-1260	PCB	27		2.6	1800	D	110	51		3
Aldrin	PEST	0.26	U	0.26	0.27	JX	0.27	0.3	U	0.3
Alpha-BHC	PEST	0.22	U	0.22	0.23	U	0.23	0.25	U	0.25
alpha-Chlordane	PEST	0.34	U	0.34	0.9	JB	0.35	2.5		0.38
beta-1,2,3,4,5,6-Hexachlorocyclohexane	PEST	0.69	U	0.69	1.9		0.71	0.79	U	0.79
Delta-BHC	PEST	0.42	U	0.42	0.44	X	0.43	0.47	U	0.47
Dichlorodiphenyldichloroethane	PEST	0.57	U	0.57	0.59	U	0.59	0.65	U	0.65
Dichlorodiphenyldichloroethylene	PEST	0.25	U	0.25	1.4	JX	0.26	17		0.28
Dichlorodiphenyltrichloroethane	PEST	0.97	JX	0.62	6.3	UD	6.3	20	X	0.7
Dieldrin	PEST	0.22	U	0.22	0.23	U	0.23	7.2		0.25
Endosulfan I	PEST	0.18	U	0.18	0.19	U	0.19	0.21	U	0.21
Endosulfan II	PEST	0.3	U	0.3	0.31	U	0.31	0.34	U	0.34
Endosulfan sulfate	PEST	0.29	U	0.29	0.3	U	0.3	0.33	U	0.33
Endrin	PEST	0.32	U	0.32	0.33	U	0.33	0.36	U	0.36
Endrin aldehyde	PEST	0.18	U	0.18	0.18	U	0.18	0.2	U	0.2
Endrin ketone	PEST	0.51	U	0.51	0.52	U	0.52	0.58	U	0.58
Gamma-BHC (Lindane)	PEST	0.48	U	0.48	0.5	U	0.5	0.55	U	0.55
gamma-Chlordane	PEST	0.28	U	0.28	0.29	U	0.29	3.2		0.32
Heptachlor	PEST	0.22	U	0.22	0.23	U	0.23	0.25	U	0.25
Heptachlor epoxide	PEST	0.44	U	0.44	0.46	U	0.46	0.5	U	0.5
Methoxychlor	PEST	0.47	U	0.47	0.48	U	0.48	0.53	U	0.53
Toxaphene	PEST	16	U	16	170	UD	170	19	U	19
1,2,4-Trichlorobenzene	SVOA	29	U	29	30	U	30	32	U	32
1,2-Dichlorobenzene	SVOA	23	U	23	23	U	23	25	U	25
1,3-Dichlorobenzene	SVOA	12	U	12	13	U	13	14	U	14
1,4-Dichlorobenzene	SVOA	14	U	14	14	U	14	15	U	15
2,4,5-Trichlorophenol	SVOA	10	U	10	11	U	11	11	U	11
2,4,6-Trichlorophenol	SVOA	10	U	10	11	U	11	11	U	11
2,4-Dichlorophenol	SVOA	10	U	10	11	U	11	11	U	11
2,4-Dimethylphenol	SVOA	69	U	69	70	U	70	75	U	75
2,4-Dinitrophenol	SVOA	350	U	350	350	U	350	380	U	380
2,4-Dinitrotoluene	SVOA	69	U	69	70	U	70	75	U	75
2,6-Dinitrotoluene	SVOA	29	U	29	30	U	30	32	U	32
2-Chloronaphthalene	SVOA	10	U	10	11	U	11	11	U	11
2-Chlorophenol	SVOA	22	U	22	22	U	22	24	U	24
2-Methylnaphthalene	SVOA	20	U	20	20	U	20	22	U	22
2-Methylphenol (cresol, o-)	SVOA	14	U	14	14	U	14	15	U	15
2-Nitroaniline	SVOA	52	U	52	53	U	53	57	U	57
2-Nitrophenol	SVOA	10	U	10	11	U	11	11	U	11
3+4 Methylphenol (cresol, m+p)	SVOA	34	U	34	35	U	35	38	U	38

Table B-4. 100-D-62, 100-D-77, 100-D-83:1 Waste Characterization and In-Process Samples - Organics. (4 pages)

CONSTITUENT	CLASS	J1H213			J1H215			J1H216		
		100-D-77 N151222, E573248			100-D-77 N151192, E573258			100-D-77 N151185, E573239		
		4/25/2011			5/4/2011			4/25/2011		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
3,3'-Dichlorobenzidine	SVOA	94	U	94	96	U	96	100	U	100
3-Nitroaniline	SVOA	76	U	76	77	U	77	83	U	83
4,6-Dinitro-2-methylphenol	SVOA	340	U	340	350	U	350	380	U	380
4-Bromophenylphenyl ether	SVOA	20	U	20	20	U	20	22	U	22
4-Chloro-3-methylphenol	SVOA	69	U	69	70	U	70	75	U	75
4-Chloroaniline	SVOA	85	U	85	87	U	87	93	U	93
4-Chlorophenylphenyl ether	SVOA	22	U	22	22	U	22	24	U	24
4-Nitroaniline	SVOA	75	U	75	77	U	77	83	U	83
4-Nitrophenol	SVOA	100	U	100	100	U	100	110	U	110
Acenaphthene	SVOA	11	U	11	11	U	11	12	U	12
Acenaphthylene	SVOA	18	U	18	18	U	18	19	U	19
Anthracene	SVOA	18	U	18	18	U	18	19	U	19
Benzo(a)anthracene	SVOA	21	U	21	24	J	21	36	J	23
Benzo(a)pyrene	SVOA	21	U	21	29	J	21	34	J	23
Benzo(b)fluoranthene	SVOA	27	U	27	28	U	28	66	JX	30
Benzo(ghi)perylene	SVOA	17	U	17	17	U	17	36	J	18
Benzo(k)fluoranthene	SVOA	42	U	42	42	U	42	46	UX	46
Bis(2-chloro-1-methylethyl)ether	SVOA	24	U	24	24	U	24	26	U	26
Bis(2-Chloroethoxy)methane	SVOA	24	U	24	24	U	24	26	U	26
Bis(2-chloroethyl) ether	SVOA	17	U	17	18	U	18	19	U	19
Bis(2-ethylhexyl) phthalate	SVOA	48	U	48	49	U	49	180	J	52
Butylbenzylphthalate	SVOA	45	U	45	46	U	46	49	U	49
Carbazole	SVOA	37	U	37	38	U	38	41	U	41
Chrysene	SVOA	28	U	28	35	J	29	36	J	31
Di-n-butylphthalate	SVOA	30	U	30	31	U	31	93	J	33
Di-n-octylphthalate	SVOA	15	U	15	15	U	15	16	U	16
Dibenz[a,h]anthracene	SVOA	20	U	20	20	U	20	22	U	22
Dibenzofuran	SVOA	21	U	21	21	U	21	23	U	23
Diethyl phthalate	SVOA	27	U	27	28	U	28	30	U	30
Dimethyl phthalate	SVOA	24	U	24	24	U	24	26	U	26
Fluoranthene	SVOA	37	U	37	38	U	38	56	J	41
Fluorene	SVOA	19	U	19	19	U	19	21	U	21
Hexachlorobenzene	SVOA	30	U	30	31	U	31	33	U	33
Hexachlorobutadiene	SVOA	10	U	10	11	U	11	11	U	11
Hexachlorocyclopentadiene	SVOA	52	U	52	53	U	53	57	U	57
Hexachloroethane	SVOA	22	U	22	23	U	23	24	U	24
Indeno(1,2,3-cd)pyrene	SVOA	23	U	23	23	U	23	25	U	25
Isophorone	SVOA	18	U	18	18	U	18	19	U	19
N-Nitroso-di-n-dipropylamine	SVOA	32	U	32	33	U	33	35	U	35
N-Nitrosodiphenylamine	SVOA	22	U	22	22	U	22	24	U	24
Naphthalene	SVOA	32	U	32	33	U	33	35	U	35
Nitrobenzene	SVOA	23	U	23	23	U	23	25	U	25
Pentachlorophenol	SVOA	340	U	340	350	U	350	380	U	380
Phenanthrene	SVOA	18	U	18	25	J	18	23	J	19
Phenol	SVOA	19	U	19	19	U	19	21	U	21
Pyrene	SVOA	13	U	13	34	J	13	54	J	14

Table B-4. 100-D-62, 100-D-77, 100-D-83:1 Waste Characterization and In-Process Samples - Organics. (4 pages)

CONSTITUENT	CLASS	J1H217 100-D-62 N151154, E573256 4/25/2011			J1H230 100-D-62 N151154, E573256 4/25/2011		
		ug/kg	Q	PQL	ug/kg	Q	PQL
Aroclor-1016	PCB	18	UD	18	74	UD	74
Aroclor-1221	PCB	51	UD	51	210	UD	210
Aroclor-1232	PCB	13	UD	13	54	UD	54
Aroclor-1242	PCB	30	UD	30	120	UD	120
Aroclor-1248	PCB	30	UD	30	120	UD	120
Aroclor-1254	PCB	350	DP	16	1100	DP	70
Aroclor-1260	PCB	500	D	16	1500	D	70
Aldrin	PEST	0.32	U	0.32	1.3	U	1.3
Alpha-BHC	PEST	4.5	X	0.27	7	JX	1.1
alpha-Chlordane	PEST	1.9	J	0.41	1.6	U	1.6
beta-1,2,3,4,5,6-Hexachlorocyclohexane	PEST	0.85	U	0.85	3.4	UN	3.4
Delta-BHC	PEST	0.51	U	0.51	4.6	J	2
Dichlorodiphenyldichloroethane	PEST	0.7	U	0.7	2.8	UN	2.8
Dichlorodiphenyldichloroethylene	PEST	12		0.3	93	N	1.2
Dichlorodiphenyltrichloroethane	PEST	4.3	X	0.75	16	X	3
Dieldrin	PEST	0.27	U	0.27	1.1	U	1.1
Endosulfan I	PEST	0.22	U	0.22	0.89	UN	0.89
Endosulfan II	PEST	0.37	U	0.37	1.5	U	1.5
Endosulfan sulfate	PEST	0.35	U	0.35	1.4	U	1.4
Endrin	PEST	0.39	U	0.39	1.5	U	1.5
Endrin aldehyde	PEST	0.22	U	0.22	0.86	U	0.86
Endrin ketone	PEST	0.62	U	0.62	2.5	U	2.5
Gamma-BHC (Lindane)	PEST	0.59	U	0.59	2.3	U	2.3
gamma-Chlordane	PEST	5.3		0.34	1.5	JX	1.3
Heptachlor	PEST	0.27	U	0.27	1.1	UN	1.1
Heptachlor epoxide	PEST	0.54	U	0.54	2.7	JX	2.2
Methoxychlor	PEST	0.57	U	0.57	2.3	U	2.3
Toxaphene	PEST	20	U	20	80	U	80
1,2,4-Trichlorobenzene	SVOA	34	U	34	150	U	150
1,2-Dichlorobenzene	SVOA	27	U	27	290	J	120
1,3-Dichlorobenzene	SVOA	15	U	15	64	U	64
1,4-Dichlorobenzene	SVOA	58	J	17	200000	DX	720
2,4,5-Trichlorophenol	SVOA	12	U	12	53	U	53
2,4,6-Trichlorophenol	SVOA	12	U	12	53	U	53
2,4-Dichlorophenol	SVOA	12	U	12	53	U	53
2,4-Dimethylphenol	SVOA	81	U	81	350	U	350
2,4-Dinitrophenol	SVOA	410	U	410	1800	U	1800
2,4-Dinitrotoluene	SVOA	81	U	81	350	U	350
2,6-Dinitrotoluene	SVOA	34	U	34	150	U	150
2-Chloronaphthalene	SVOA	12	U	12	53	U	53
2-Chlorophenol	SVOA	26	U	26	110	U	110
2-Methylnaphthalene	SVOA	23	U	23	180	J	100
2-Methylphenol (cresol, o-)	SVOA	16	U	16	69	U	69
2-Nitroaniline	SVOA	61	U	61	270	U	270
2-Nitrophenol	SVOA	12	U	12	53	U	53
3+4 Methylphenol (cresol, m+p)	SVOA	40	U	40	180	U	180

Table B-4. 100-D-62, 100-D-77, 100-D-83:1 Waste Characterization and In-Process Samples - Organics. (4 pages)

CONSTITUENT	CLASS	J1H217			J1H230		
		100-D-62			100-D-62		
		N151154, E573256			N151154, E573256		
		4/25/2011			4/25/2011		
		ug/kg	Q	PQL	ug/kg	Q	PQL
3,3'-Dichlorobenzidine	SVOA	110	U	110	480	U	480
3-Nitroaniline	SVOA	89	U	89	390	U	390
4,6-Dinitro-2-methylphenol	SVOA	400	U	400	1800	U	1800
4-Bromophenylphenyl ether	SVOA	23	U	23	100	U	100
4-Chloro-3-methylphenol	SVOA	81	U	81	350	U	350
4-Chloroaniline	SVOA	100	U	100	440	U	440
4-Chlorophenylphenyl ether	SVOA	26	U	26	110	U	110
4-Nitroaniline	SVOA	88	U	88	390	U	390
4-Nitrophenol	SVOA	120	U	120	520	U	520
Acenaphthene	SVOA	13	U	13	310	J	55
Acenaphthylene	SVOA	21	U	21	90	U	90
Anthracene	SVOA	29	J	21	250	J	90
Benzo(a)anthracene	SVOA	150	J	24	370	J	110
Benzo(a)pyrene	SVOA	160	J	24	290	J	110
Benzo(b)fluoranthene	SVOA	270	JX	32	530	JX	140
Benzo(ghi)perylene	SVOA	160	J	20	85	U	85
Benzo(k)fluoranthene	SVOA	49	UX	49	210	UX	210
Bis(2-chloro-1-methylethyl)ether	SVOA	28	U	28	120	U	120
Bis(2-Chloroethoxy)methane	SVOA	28	U	28	120	U	120
Bis(2-chloroethyl) ether	SVOA	20	U	20	88	U	88
Bis(2-ethylhexyl) phthalate	SVOA	1200		56	240	U	240
Butylbenzylphthalate	SVOA	52	U	52	230	U	230
Carbazole	SVOA	44	U	44	190	U	190
Chrysene	SVOA	190	J	33	460	J	140
Di-n-butylphthalate	SVOA	5000		35	1400	J	150
Di-n-octylphthalate	SVOA	18	U	18	77	U	77
Dibenz[a,h]anthracene	SVOA	23	U	23	100	U	100
Dibenzofuran	SVOA	24	U	24	220	J	110
Diethyl phthalate	SVOA	32	U	32	140	U	140
Dimethyl phthalate	SVOA	28	U	28	120	U	120
Fluoranthene	SVOA	230	J	44	1200	J	190
Fluorene	SVOA	22	U	22	320	J	96
Hexachlorobenzene	SVOA	35	U	35	150	U	150
Hexachlorobutadiene	SVOA	12	U	12	53	U	53
Hexachlorocyclopentadiene	SVOA	61	U	61	270	U	270
Hexachloroethane	SVOA	26	U	26	110	U	110
Indeno(1,2,3-cd)pyrene	SVOA	120	J	27	120	U	120
Isophorone	SVOA	21	U	21	90	U	90
N-Nitroso-di-n-dipropylamine	SVOA	38	U	38	170	U	170
N-Nitrosodiphenylamine	SVOA	26	U	26	110	U	110
Naphthalene	SVOA	38	U	38	190	J	170
Nitrobenzene	SVOA	27	U	27	120	U	120
Pentachlorophenol	SVOA	400	U	400	1800	U	1800
Phenanthrene	SVOA	86	J	21	1600	J	90
Phenol	SVOA	22	U	22	96	U	96
Pyrene	SVOA	240	J	15	1000	J	64

APPENDIX C

CALCULATIONS

APPENDIX C

CALCULATION BRIEFS

The calculations provided in this appendix are copies of the originals that are kept in the active Washington Closure Hanford project files and are available upon request. When the project is completed, the files will be stored in a U.S. Department of Energy, Richland Operations Office repository. These calculations have been prepared in accordance with ENG-1, *Engineering Services*, ENG-1-4.5, "Project Calculations," Washington Closure Hanford, Richland, Washington. The calculations provided in this appendix include:

100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Cleanup Verification 95% UCL Calculations, 0100D-CA-V0508, Rev. 0, Washington Closure Hanford, Richland, Washington.

100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Direct Contact Hazard Quotient and Carcinogenic Risk Calculation, 0100D-CA-V0509, Rev. 0, Washington Closure Hanford, Richland, Washington.

100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Protection of Groundwater Hazard Quotient and Carcinogenic Risk Calculation, 0100D-CA-V0510, Rev. 0, Washington Closure Hanford, Richland, Washington.

DISCLAIMER FOR CALCULATIONS
The calculations that are provided in this appendix have been generated to document compliance with established cleanup levels. These calculations should be used in conjunction with other relevant documents in the administrative record.

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CALCULATION COVER SHEET

Project Title: 100-D Field Remediation **Job No. 14655**

Area: 100-D

Discipline: Environmental *Calculation No: 0100D-CA-V0508

Subject: 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Cleanup Verification 95% UCL Calculation

Computer Program: Excel Program No: Excel 2003

The attached calculations have been generated to document compliance with established cleanup levels. These calculations should be used in conjunction with other relevant documents in the administrative record.

Committed Calculation ☒ Preliminary ☐ Superseded ☐ Voided ☐

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover = 1 Sheets = 24 Attm. 1 = 31 Total = 56	N. K. Schiffern N. K. Schiffern	J. D. Skoglie [signature]	C. H. Dobie CH Dobie	D. F. Obenauer D. F. Obenauer	10/14/13

SUMMARY OF REVISION

WCH-DE-018 (05/08/2007) *Obtain Calc. No. from Document Control and Form from Intranet

Washington Closure Hanford **CALCULATION SHEET**

Originator N. K. Schiffern NO	**Date** 07/08/13	**Calc. No.** 0100D-CA-V0508	**Rev. No.** 0		
Project 100-D Field Remediation	**Job No.** 14655	**Checked** J. D. Skoglie	**Date** 07/08/13		
Subject 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Cleanup Verification 95% UCL Calculations			**Sheet No.** 1 of 24		

Summary

Purpose:
Calculate the 95% upper confidence limit (UCL) values to evaluate compliance with cleanup standards for the subject site. Also, perform the *Washington Administrative Code* (WAC) 173-340-740(7)(e) Model Toxics Control Act (MTCA) 3-part test for nonradionuclide analytes and calculate the relative percent difference (RPD) for primary-duplicate sample pairs for each contaminant of concern (COC) and contaminant of potential concern (COPC), as necessary.

Table of Contents:

Given/References:
1) Sample Results (Attachment 1).
2) DOE-RL, 2009a, 100 Area Remedial Action Sampling and Analysis Plan (SAP), DOE/RL-96-22, Rev. 5, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
3) DOE-RL, 2009b, Remedial Design Report/Remedial Action Work Plan for the 100 Area (RDR/RAWP), DOE/RL-96-17, Rev. 6, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
4) Ecology, 1992, Statistical Guidance for Ecology Site Managers, Publication #92-54, Washington Department of Ecology, Olympia, Washington.
5) Ecology, 1993, Statistical Guidance for Ecology Site Managers, Supplement S-6, Analyzing Site or Background Data with Below-detection Limit or Below-PQL Values (Censored Data Sets), Publication #92-54, Washington Department of Ecology, Olympia, Washington.
6) Ecology, 2012, Cleanup Levels and Risk Calculations (CLARC) Database, Washington State Department of Ecology, Olympia, Washington, <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.
7) EPA, 1989, Risk Assessment Guidance for Superfund: Volume 1, Human Health Evaluation Manual, Part A; Interim Final, EPA/540/1-89/002, U.S. Environmental Protection Agency, Washington, D. C.
8) WAC 173-340, 1996, "Model Toxic Control Act - Cleanup," Washington Administrative Code.

Solution:
Calculation methodology is described in Ecology Pub. #92-54 (Ecology 1992, 1993), below, and in the RDR/RAWP (DOE-RL 2006b). Use data from attached worksheets to perform the 95% UCL calculation for each analyte, the WAC 173-340-740(7)(e) 3-part test for nonradionuclides, and the RPD calculations for each COC/COPC. The hazard quotient and carcinogenic risk calculations are located in a separate calculation brief as an appendix to the Remaining Sites Verification Package (RSVP).

Calculation Description:
The subject calculations were performed on statistical data from soil verification samples (Attachment 1) from the 100-D-62, 100-D-77, and 100-D-83:1 waste sites. The data were entered into an EXCEL 2003 spreadsheet and calculations performed by using the built-in spreadsheet functions and/or creating formulae within the cells. The statistical evaluation of data for use in accordance with the RDR/RAWP (DOE-RL 2006b) is documented by this calculation. Duplicate RPD results are used in evaluation of data quality within the RSVP for these sites.

Methodology:
The 100-D-62, 100-D-77, and 100-D-83:1 waste sites underwent verification sampling at two decision units: Excavation Area and Staging Pile Area. Twelve statistical samples were collected from each decision unit. Also included with the statistical samples were one duplicate and one split sample from each decision unit. In addition, ten focused samples were collected from Excavation decision unit. Benzo(a)pyrene results from sample location EXC-3 and the entire data from sample HEIS numbers J1PW84, J1R648, J1R650, J1R651, and J1PWC8 are provided for informational purposes only as discussed in the RSVP for these sites. Further information is explained in the RSVP.

Analytical results for all sampling locations are summarized in the tables provided on sheets 4 and 5. Further information of the sample data quality is presented in the data quality assessment section of the associated RSVP.

Summary (continued)

Methodology, continued:

For nonradioactive analytes with ≤ 50% of the data below detection limits, the statistical value calculated to evaluate the effectiveness of cleanup is the 95% UCL. For nonradioactive analytes with >50% of the data below detection limits, as determined by direct inspection of the sample results (Attachment 1), the maximum detected value for the data set (which includes primary and duplicate samples) is used instead of the 95% UCL, and no further calculations are performed for those data sets. For convenience, these maximum detected values are included in the summary tables that follow. The 95% UCL was not calculated for data sets with no reported detections. Calculated cleanup levels are not available in (Ecology 2012) under WAC 173-340-740(3) for calcium, magnesium, potassium, silicon, and sodium. The EPA's *Risk Assessment Guidance for Superfund* (EPA 1989) recommends that aluminum and iron not be considered in site risk evaluations. Therefore, aluminum, calcium, iron, magnesium, potassium, silicon, and sodium are not considered site COCs/COPCs and are also not included in these calculations.

All nonradionuclide data reported as being undetected are set to ½ the detection limit value for calculation of the statistics (Ecology 1993). For the statistical evaluation of duplicate sample pairs, the samples are averaged before being included in the data set, after adjustments for censored data as described above. For radionuclide data, calculation of the statistics is done using the reported value. In cases where the laboratory does not report a value below the minimum detectable activity (MDA), half of the MDA is used in the calculation. For the statistical evaluation of duplicate sample pairs, the samples are averaged before being included in the data set, after adjustments for censored data as described above.

For nonradionuclides, the WAC 173-340 statistical guidance suggests that a test for distributional form be performed on the data and the 95% UCL calculated on the appropriate distribution using Ecology software. For nonradionuclide small data sets ($n < 10$), the calculations are performed assuming nonparametric distribution, so no tests for distribution are performed. For nonradionuclide data sets of ten or greater, as for the subject site, distributional testing is done using Ecology's MTCAStat software (Ecology 1993). Due to differences in addressing censored data between the RDR/RAWP (DOE-RL 2006b) and MTCAStat coding and due to a limitation in the MTCAStat coding (no direct capability to address variable quantitation limits within a data set), substitutions for censored data are performed before software input and the resulting data set treated as uncensored.

The WAC 173-340-740(7)(e) 3-part test is performed for nonradionuclide analytes only and determines if:
1) the 95% UCL exceeds the most stringent cleanup limit for each COPC/COC,
2) greater than 10% of the raw data exceed the most stringent cleanup limit for each COPC/COC,
3) the maximum value of the raw data set exceeds two times the most stringent cleanup limit for each COPC/COC.

The RPD is calculated when both the primary value and the duplicate value for a given analyte are above detection limits and are greater than 5 times the target detection limit (TDL). The TDLs are pre-determined values for analytical methods and constituents with cleanup levels as listed in Table 2-1 of the SAP (DOE-RL 2006a). Table 2-1 includes nominal TDLs for identified methods based organic analyses. The nominal TDLs are also used in support of the RPD calculation for the methods based analytes. TDLs not included in Table 2-1 are based on the laboratory and/or methods used. Where direct evaluation of the attached sample data showed that a given analyte was not detected in the primary and/or duplicate sample, further evaluation of the RPD value was not performed. The RPD calculations use the following formula:

$$RPD = [\,|M-S|/((M+S)/2)]*100$$

where, M = Main Sample Value S = Split (or duplicate) Sample Value

For quality assurance/quality control (QA/QC) duplicate RPD calculations, a value less than 30% indicates the data compare favorably. If the RPD is greater than 30%, further investigation regarding the usability of the data is performed. To assist in the identification of anomalous sample pairs, when an analyte is detected in the primary or duplicate/split sample, but was quantified at less than 5 times the TDL in one or both samples, an additional parameter is evaluated. In this case, if the difference between the primary and duplicate/split result exceeds a control limit of 2 times the TDL, further assessment regarding the usability of the data is performed. Additional discussion as necessary is provided in the data quality assessment section of the applicable RSVP.

Washington Closure Hanford **CALCULATION SHEET**

Originator N. K. Schiffern	**Date** 07/01/13	**Calc. No.** 0100D-CA-V0508	**Rev. No.** 0
Project 100-D Field Remediation	**Job No.** 14655	**Checked** J. D. Skoglie	**Date** 07/01/13
Subject 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Cleanup Verification 95% UCL Calculations			**Sheet No.** 3 of 24

Summary (continued)

QUALIFIER LIST

B = estimate
C = detected in both the sample and the associated QC blank, sample concentration was </= 5X blank concentration.
D = dilution
J = estimate
N = recovery is outside control limits
M = sample duplicate precision not met.
P = aroclor flag, greater than 25% difference for detected concentrations between the two GC columns.
R = rejected
U = undetected
X (metals) = serial dilution in the analytical batch indicates that physical and chemical interferences are present.
X (organics) = More than 40% difference between columns, lower result reported (organics).

ACRONYM LIST

-- = not applicable
DE = direct exposure
EXC = excavation
EXT = extended
FS = focused sample
GW = groundwater
MTCA = *Model Toxics Control Act*
NA = not applicable
PAH = polycyclic aromatic hudrocarbons
PQL = practical quantitation limit
Q = qualifier
QA/QC = quality assurance/quality control
RAG = remedial action goal
RDR/RAWP = remedial design report/remedial action work plan
RESRAD = RESidual RADioactivity (dose model)
RPD = relative percent difference
RSVP = remaining sites verification package
SAP = sampling and analysis plan
SPA = staging pile area
TDL = target detection limit
TPH = total petroleum hydrocarbons
UCL = upper confidence limit
WAC = Washington Administrative Code

Summary (continued)

Results:
The results presented in the tables that follow include the summary of the results of the 95% UCL calculations for the excavation, staging pile area, focused samples, the WAC 173-340-740(7)(e) 3-part test evaluation, and the RPD calculations, and are for use in risk analysis and the RSVP for these sites.

Results Summary - Excavation Samples [a]

Analyte	EXC		SPA		Focused	Units
	95% UCL Result	Maximum Result	95% UCL Result	Maximum Result		
Antimony	--	0.40	--	0.87	1.1	mg/kg
Arsenic	2.9	--	2.5	--	2.5	mg/kg
Barium	66.0	--	57.6	--	65.9	mg/kg
Beryllium	0.37	--	0.18	--	0.51	mg/kg
Boron	--	1.3	--	1.2	1.7	mg/kg
Cadmium	--	0.062	0.12	--	0.18	mg/kg
Chromium	9.1	--	7.9	--	7.4	mg/kg
Cobalt	10.0	--	7.6	--	11.6	mg/kg
Copper	16.2	--	15.2	--	19.4	mg/kg
Hexavalent chromium	--	--	0.313	--	0.259	mg/kg
Lead	7.8	--	5.0	--	7.8	mg/kg
Manganese	331	--	287	--	337	mg/kg
Mercury	0.12	--	0.034	--	0.15	mg/kg
Molybdenum	0.43	--	0.29	--	0.51	mg/kg
Nickel	13.2	--	10.3	--	10.8	mg/kg
Vanadium	75.5	--	52.8	--	113	mg/kg
Zinc	50.3	--	43.0	--	48.2	mg/kg
Chloride	--	4.8	9.3	--	15.5	mg/kg
Fluoride	--	0.92	--	--	1.4	mg/kg
Nitrogen in Nitrate	1.2	--	1.7	--	2.4	mg/kg
Nitrogen in Nitrite and Nitrate	2.9	--	1.5	--	1.9	mg/kg
Sulfate	29.0	--	13.0	--	3890	mg/kg
TPH - diesel	7.9	--	5.9	--	16	mg/kg
TPH - diesel EXT	18.1	--	14	--	24	mg/kg
2-Methylnaphthalene		0.12	--	--	--	mg/kg
Acenaphthene (Method 8310)	--	0.19	--	--	--	mg/kg
Acenaphthene (Method 8270)	--	0.39	--	--	--	mg/kg
Acenaphthylene (Method 8310)	--	0.013	--	--	--	mg/kg
Acenaphthylene (Method 8270)	--	0.12	--	--	--	mg/kg
Anthracene (Method 8310)	--	0.39	--	--	--	mg/kg
Anthracene (Method 8270)	--	1.0	--	--	--	mg/kg
Benzo(a)anthracene (Method 8310)	--	0.66	--	0.018	0.011	mg/kg
Benzo(a)anthracene (Method 8270)	--	1.8	--	0.036	0.022	mg/kg
Benzo(a)pyrene (Method 8310)	--	0.023	--	0.033	0.016	mg/kg
Benzo(a)pyrene (Method 8270)	--	0.047	--	0.032	--	mg/kg
Benzo(b)fluoranthene (Method 8310)	--	0.50	--	0.033	0.017	mg/kg
Benzo(b)fluoranthene (Method 8270)	--	2.1	--	0.064	0.035	mg/kg
Benzo(ghi)perylene (Method 8310)	--	0.32	--	0.025	--	mg/kg
Benzo(ghi)perylene (Method 8270)	--	0.62	--	0.023	--	mg/kg
Benzo(k)fluoranthene (Method 8310)	--	0.18	--	0.0090	0.012	mg/kg
Carbazole	--	0.57	--	--	--	mg/kg
Chrysene (Method 8310)	--	0.56	--	0.028	0.018	mg/kg
Chrysene (Method 8270)	--	1.8	--	0.045	0.029	mg/kg
Dibenz(a,h)anthracene (Method 8310)	--	0.092	--	--	--	mg/kg
Dibenz(a,h)anthracene (Method 8270)	--	0.16	--	--	--	mg/kg
Dibenzofuran	--	0.34	--	--	--	mg/kg
Fluoranthene (Method 8310)	--	1.2	--	0.046	0.034	mg/kg
Fluoranthene (Method 8270)	--	3.7	--	0.061	0.036	mg/kg
Fluorene (Method 8310)	--	0.25	--	--	--	mg/kg
Fluorene (Method 8270)	--	0.58	--	--	--	mg/kg
Indeno(1,2,3-cd)pyrene (Method 8310)	--	0.30	--	0.021	0.014	mg/kg
Indeno(1,2,3-cd)pyrene (Method 8270)	--	0.55	--	--	--	mg/kg
Naphthalene (Method 8270)	--	0.17	--	--	--	mg/kg
Phenenthrene (Method 8310)	--	1.2	--	--	--	mg/kg
Phenenthrene (Method 8270)	--	3.9	--	0.022	0.020	mg/kg
Pyrene (Method 8310)	--	1.3	--	0.060	0.040	mg/kg
Pyrene (Method 8270)	--	2.9	--	0.066	0.037	mg/kg
Aroclor-1260	--	0.0075	0.0086	--	0.0034	mg/kg
Endosulfan sulfate	--	--	--	--	0.00033	mg/kg
3-Part Test Evaluation:	**EXC**		**SPA**			
95% UCL or maximum > Cleanup Limit?	NO	YES	NO	YES		
> 10% above Cleanup Limit?	NO	YES	NO	YES		
Any sample > 2x Cleanup Limit?	NO	YES	NO	YES		

[a] The 95% UCL result or maximum value, depending on data censorship, as described in the methodology section.

CALCULATION SHEET

Washington Closure Hanford

Originator	N. K. Schiffern NO	**Date**	07/01/13	**Calc. No.**	0100D-CA-V0508
Project	100-D Field Remediation	**Job No.**	14655	**Checked**	J. D. Skoglie JD
Subject	100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Cleanup Verification 95% UCL Calculations				

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Summary (continued)

Results:
The results presented in the tables that follow include the summary of the results of the 95% UCL calculations for the excavation, staging pile area, focused samples, the WAC 173-340-740(7)(e) 3-part test evaluation, and the RPD calculations, and are for use in risk analysis and the RSVP for these sites.

Relative Percent Difference Results and QA/QC Analysis[a]

Analyte	EXC		SPA	
	Duplicate	**Split**	**Duplicate**	**Split**
Aluminum	1.0%	16.2%	9.3%	5.4%
Barium	3.2%	12.7%	17.3%	1.5%
Calcium	3.9%	15.1%	9.0%	0.0%
Chromium	3.0%	18.5%	3.4%	8.3%
Copper	0.7%	16.9%	4.2%	10.1%
Iron	0.6%	19.3%	2.0%	10.8%
Magnesium	1.2%	20.6%	6.1%	5.1%
Manganese	1.0%	17.7%	2.3%	1.1%
Silicon	12.0%	***38.0%***	27.4%	***165.4%***
Sodium	4.0%	--	--	1.4%
Vanadium	2.9%	9.6%	6.1%	16.0%
Zinc	0.6%	12.8%	1.8%	2.9%
Acenaphthene (Method 8310)	***62.1%***	***155.8%***	--	--
Anthracene (Method 8310)	--	11.4%	--	--
Benzo(a)anthracene (Method 8310)	***122.0%***	27.0%	--	--
Benzo(a)pyrene (Method 8310)	***138.5%***	11.4%	--	--
Benzo(b)fluoranthene (Method 8310)	***122.6%***	***64.2%***	--	--
Benzo(ghi)perylene (Method 8310)	--	***45.4%***	--	--
Benzo(k)fluoranthene (Method 8310)	--	14.9%	--	--
Chrysene (Method 8310)	***124.6%***	11.9%	--	--
Fluoranthene (Method 8310)	***133.3%***	4.9%	--	--
Fluorene (Method 8310)	--	21.7%	--	--
Indeno(1,2,3-cd)pyrene (Method 8310)	--	***40.5%***	--	--
Phenanthrene (Method 8310)	***128.8%***	0.0%	--	--
Pyrene (Method 8310)	***144.4%***	***35.4%***	--	--

[a]RPD listed where result produced, based on criteria. If RPD not required, no value is listed. The significance of the reported RPD values, including values greater than 30% for duplicate analysis and 35 % for split analysis, is addressed in the data quality assessment section of the RSVP.

CALCULATION SHEET

Washington Closure Hanford
Originator N. K. Schiffern
Project 100-N Field Remediation
Subject 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Cleanup Verification 95% UCL Calculations

Date 07/01/13
Job No. 14655

Calc. No. 0100D-CA-V0508
Checked J. D. Skoglie

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100-D-77, 100-D-62, and 100-D-83:1 Statistical Calculations

Verification Data -Excavation (EXC)

Sample Area	Sample Number	Sample Date	Arsenic mg/kg	Arsenic Q	Arsenic PQL	Barium mg/kg	Barium Q	Barium PQL	Beryllium mg/kg	Beryllium Q	Beryllium PQL	Chromium mg/kg	Chromium Q	Chromium PQL	Cobalt mg/kg	Cobalt Q	Cobalt PQL	Copper mg/kg	Copper Q	Copper PQL	Lead mg/kg	Lead Q	Lead PQL	Manganese mg/kg	Manganese Q	Manganese PQL
EXC-3	J1PW83	9/18/2012	3.6		0.64	61.3		0.074	0.27		0.032	13.0	X	0.057	6.1	X	0.098	14.1		0.21	3.9	X	0.26	289	X	0.098
Duplicate of J1PW83	J1PW93	9/18/2012	3.5		0.61	63.3		0.071	0.26		0.031	13.4	X	0.054	6.1	X	0.093	14.0		0.20	4.0	X	0.25	286	X	0.093
EXC-1	J1PW81	9/18/2012	3.6		0.62	65.4		0.071	0.34		0.031	11.1	X	0.054	7.9	X	0.094	17.9		0.20	18.5	X	0.25	330	X	0.094
EXC-2	J1PW82	9/18/2012	2.2		0.58	73.0		0.067	0.27		0.029	8.3	X	0.051	7.8	X	0.088	15.5		0.19	7.4	X	0.24	305	X	0.088
EXC-4	J1RJ77	3/15/2013	1.2		0.62	46.8	X	0.072	0.53	B	0.16	4.8		0.055	10.8		0.47	14.0		1.0	2.2	B	1.3	323		0.095
EXC-5	J1PW85	9/18/2012	3.1		0.57	68.3		0.065	0.34	B	0.14	8.2	X	0.050	9.6	X	0.43	16.3		0.93	9.1	X	1.2	321	X	0.086
EXC-6	J1PW86	9/18/2012	2.6		0.59	73.7		0.068	0.33	B	0.15	8.5	X	0.052	9.5	X	0.45	14.5		0.97	4.1	X	1.2	320	X	0.089
EXC-7	J1PW87	9/18/2012	2.3		0.55	60.4		0.064	0.32	B	0.14	7.1	X	0.049	9.7	X	0.42	15.7		0.91	3.3	X	1.1	305	X	0.084
EXC-8	J1PW88	9/18/2012	1.9		0.59	42.1		0.068	0.33	B	0.15	5.3	X	0.052	10.8	X	0.45	15.2		0.97	3.3	X	1.2	324	X	0.090
EXC-9	J1PW89	9/18/2012	2.3		0.62	55.2		0.071	0.35	B	0.15	6.9	X	0.054	10.3	X	0.47	16.2		1.0	4.6	X	1.3	318	X	0.093
EXC-10	J1PW90	9/18/2012	2.5		0.63	56.7		0.072	0.37	B	0.16	6.2	X	0.055	10.8	X	0.48	16.8		1.0	4.6	X	1.3	388	X	0.095
EXC-11	J1PW91	9/18/2012	1.9		0.66	53.3		0.076	0.32	B	0.16	5.9	X	0.058	10.6	X	0.50	14.9		1.1	3.8	X	1.3	322	X	0.10
EXC-12	J1PW92	9/18/2012	2.2		0.57	62.8		0.065	0.26		0.028	6.8	X	0.050	6.9	X	0.086	16.2		0.19	3.9	X	0.23	271	X	0.086

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg	Chromium mg/kg	Cobalt mg/kg	Copper mg/kg	Lead mg/kg	Manganese mg/kg
EXC-3	J1PW83/J1PW93	9/18/2012	3.6	62.3	0.27	13.2	6.1	14.1	4.0	288
EXC-1	J1PW81	9/18/2012	3.6	65.4	0.34	11.1	7.9	17.9	18.5	330
EXC-2	J1PW82	9/18/2012	2.2	73.0	0.27	8.3	7.8	15.5	7.4	305
EXC-4	J1RJ77	3/15/2013	1.2	46.8	0.53	4.8	10.8	14.0	2.2	323
EXC-5	J1PW85	9/18/2012	3.1	68.3	0.34	8.2	9.6	16.3	9.1	321
EXC-6	J1PW86	9/18/2012	2.6	73.7	0.33	8.5	9.5	14.5	4.1	320
EXC-7	J1PW87	9/18/2012	2.3	60.4	0.32	7.1	9.7	15.7	3.3	305
EXC-8	J1PW88	9/18/2012	1.9	42.1	0.33	5.3	10.8	15.2	3.3	324
EXC-9	J1PW89	9/18/2012	2.3	55.2	0.35	6.9	10.3	16.2	4.6	318
EXC-10	J1PW90	9/18/2012	2.5	56.7	0.37	6.2	10.8	16.8	4.6	388
EXC-11	J1PW91	9/18/2012	1.9	53.3	0.32	5.9	10.6	14.9	3.8	322
EXC-12	J1PW92	9/18/2012	2.2	62.8	0.26	6.8	6.9	16.2	3.9	271

Statistical Computations

	Arsenic	Barium	Beryllium	Chromium	Cobalt	Copper	Lead	Manganese
95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.
N	12	12	12	12	12	12	12	12
% < Detection limit	0%	0%	0%	0%	0%	0%	0%	0%
Mean	2.4	60.0	0.34	7.7	9.2	15.6	5.7	318
Standard deviation	0.70	9.7	0.071	2.4	1.6	1.2	4.4	28.0
95% UCL on mean	2.9	66.0	0.37	9.1	10.0	16.2	7.8	331
Maximum value	3.6	73.7	0.53	13.4	10.8	17.9	18.5	388
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)	20 DE, GW & River Protection	200 GW Protection	1.51 GW & River Protection	18.5 GW & River Protection	15.7 GW Protection	22.0 River Protection	10.2 GW & River Protection	512 GW & River Protection
WAC 173-340 3-PART TEST								
95% UCL > Cleanup Limit?	NA	NA	NA	NA	NA	NA	NO	NA
> 10% above Cleanup Limit?	NA	NA	NA	NA	NA	NA	NO	NA
Any sample > 2X Cleanup Limit?	NA	NA	NA	NA	NA	NA	NO	NA
WAC 173-340 Compliance?	Because all values are below background (6.5 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (132 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (1.51 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (18.5 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (15.7 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (22.0 mg/kg) the WAC 173-340 3-part test is not required.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	Because all values are below background (512 mg/kg) the WAC 173-340 3-part test is not required.

Qualifiers are defined on page 3.

Washington Closure Hanford

CALCULATION SHEET

Originator N. K. Schiffern NKS
Project 100-N Field Remediation
Subject 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Cleanup Verification 95% UCL Calculations

Date 07/01/13
Job No. 14655

Calc. No. 0100D-CA-V0508
Checked J. D. Skoglie JDS

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100-D-77, 100-D-62, and 100-D-83:1 Statistical Calculations

Verification Data -Excavation (EXC)

Sample Area	Sample Number	Sample Date	Mercury			Molybdenum			Nickel			Vanadium			Zinc			Nitrogen in Nitrate			Nitrogen in Nitrite and Nitrate			Sulfate		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-3	J1PW83	9/18/2012	0.0074	B	0.0051	0.25	B	0.25	12.5	X	0.12	40.4		0.092	35.0	X	0.39	0.67	BJ	0.31	1.2	N	0.30	1.7	U	1.7
Duplicate of J1PW83	J1PW93	9/18/2012	0.0068	B	0.0052	0.24	U	0.24	12.7	X	0.11	41.6		0.088	34.8	X	0.37	0.57	BJ	0.29	1.3		0.30	1.6	U	1.6
EXC-1	J1PW81	9/18/2012	0.14		0.0056	0.60	B	0.24	13.1	X	0.12	54.9		0.088	65.7	X	0.37	0.77	BJ	0.31	1.6	N	0.31	1.7	U	1.7
EXC-2	J1PW82	9/18/2012	0.075		0.0057	0.54	B	0.23	11.9	X	0.11	65.0		0.083	48.8	X	0.35	2.6	BJ	0.31	3.3		0.30	81.7		1.7
EXC-4	J1RJ77	3/15/2013	0.013	B	0.0056	0.38	B	0.25	10.0		0.12	75.3		0.44	47.4	X	0.38	0.71	B	0.32	0.30	U	0.30	9.7		1.7
EXC-5	J1PW85	9/18/2012	0.092		0.0060	0.48	B	0.22	12.2	X	0.11	71.8		0.40	53.5	X	0.34	1.0	BJ	0.31	7.8		0.31	34.3		1.7
EXC-6	J1PW86	9/18/2012	0.022		0.0051	0.31	B	0.23	14.7	X	0.11	71.6		0.42	42.9	X	0.36	0.95	BJ	0.30	1.4		0.32	51.5		1.7
EXC-7	J1PW87	9/18/2012	0.0055	B	0.0050	0.29	B	0.22	12.5	X	0.10	71.2		0.40	41.5	X	0.33	0.84	BJ	0.32	1.3		0.31	9.9		1.7
EXC-8	J1PW88	9/18/2012	0.0062	B	0.0057	0.33	B	0.23	11.0	X	0.11	84.8		0.42	44.6	X	0.36	0.49	BJ	0.32	1.0		0.31	1.7	U	1.7
EXC-9	J1PW89	9/18/2012	0.027		0.0060	0.26	B	0.24	12.1	X	0.11	73.9		0.44	44.7	X	0.37	0.58	BJ	0.30	1.1		0.30	1.6	U	1.6
EXC-10	J1PW90	9/18/2012	0.0089	B	0.0058	0.27	B	0.25	14.5	X	0.12	75.0		0.45	45.2	X	0.38	0.57	BJ	0.30	1.2		0.31	1.6	U	1.6
EXC-11	J1PW91	9/18/2012	0.0064	U	0.0064	0.31	B	0.26	13.5	X	0.12	85.4		0.47	45.3	X	0.40	0.30	UR	0.30	1.2		0.31	1.7	U	1.7
EXC-12	J1PW92	9/18/2012	0.020		0.0055	0.28	B	0.22	10.3	X	0.11	58.0		0.081	39.6	X	0.34	1.7	BJ	0.31	2.6		0.30	8.1		1.7

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Mercury mg/kg	Molybdenum mg/kg	Nickel mg/kg	Vanadium mg/kg	Zinc mg/kg	Nitrogen in Nitrate mg/kg	Nitrogen in Nitrite and Nitrate mg/kg	Sulfate mg/kg
EXC-3	J1PW83/J1PW93	9/18/2012	0.0071	0.19	12.6	41.0	34.9	0.62	1.3	0.83
EXC-1	J1PW81	9/18/2012	0.14	0.60	13.1	54.9	65.7	0.77	1.6	0.85
EXC-2	J1PW82	9/18/2012	0.075	0.54	11.9	65.0	48.8	2.6	3.3	81.7
EXC-4	J1RJ77	3/15/2013	0.013	0.38	10.0	75.3	47.4	0.71	0.15	9.7
EXC-5	J1PW85	9/18/2012	0.092	0.48	12.2	71.8	53.5	1.0	7.8	34.3
EXC-6	J1PW86	9/18/2012	0.022	0.31	14.7	71.6	42.9	0.95	1.4	51.5
EXC-7	J1PW87	9/18/2012	0.0055	0.29	12.5	71.2	41.5	0.84	1.3	9.9
EXC-8	J1PW88	9/18/2012	0.0062	0.33	11.0	84.8	44.6	0.49	1.0	0.85
EXC-9	J1PW89	9/18/2012	0.027	0.26	12.1	73.9	44.7	0.58	1.1	0.80
EXC-10	J1PW90	9/18/2012	0.0089	0.27	14.5	75.0	45.2	0.57	1.2	0.80
EXC-11	J1PW91	9/18/2012	0.0032	0.31	13.5	85.4	45.3	0.15	1.2	0.85
EXC-12	J1PW92	9/18/2012	0.020	0.28	10.3	58.0	39.6	1.7	2.6	8.1

Statistical Computations

	Mercury	Molybdenum	Nickel	Vanadium	Zinc	Nitrogen in Nitrate	Nitrogen in Nitrite and Nitrate	Sulfate
95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat normal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.
N	12	12	12	12	12	12	12	12
% < Detection limit	8%	0%	0%	0%	0%	8%	8%	50%
Mean	0.035	0.35	12.4	69.0	46.2	0.92	2.0	16.7
Standard deviation	0.044	0.12	1.5	12.6	7.7	0.65	2.0	26.0
95% UCL on mean	0.12	0.43	13.2	75.5	50.3	1.2	2.9	29.0
Maximum value	0.14	0.60	14.7	85.4	65.7	2.6	7.8	81.7
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)	0.33 GW & River Protection	8 GW Protection	19.1 GW Protection	85.1 GW Protection	67.8 River Protection	1000 River Protection	1000 River Protection	25000 GW Protection
WAC 173-340 3-PART TEST								
95% UCL > Cleanup Limit?	NA	NO	NA	NO	NA	NA	NA	NA
> 10% above Cleanup Limit?	NA	NO	NA	NO	NA	NA	NA	NA
Any sample > 2X Cleanup Limit?	NA	NO	NA	NO	NA	NA	NA	NA
WAC 173-340 Compliance?	Because all values are below background (0.33 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (19.1 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (67.8 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (11.8 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (11.8 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (237 mg/kg) the WAC 173-340 3-part test is not required.

Qualifiers are defined on page 3.

CALCULATION SHEET

Washington Closure Hanford

Originator N. K. Schiffern NO	**Date** 07/01/13	**Calc. No.** 0100D-CA-V0508	**Rev. No.** 0
Project 100-D Field Remediation	**Job No.** 14655	**Checked** J. D. Skoglie JDS	**Date** 07/01/13
Subject 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Cleanup Verification 95% UCL Calculations			**Sheet No.** 8 of 24

100-D-77, 100-D-62, and 100-D-83:1 Statistical Calculations

Verification Data -Excavation (EXC)

Sample Area	Sample Number	Sample Date	TPH - Diesel ug/kg	Q	PQL	TPH - Diesel EXT ug/kg	Q	PQL
EXC-3	J1PW83	9/18/2012	24000		630	32000		920
Duplicate of J1PW83	J1PW93	9/18/2012	3000	J	660	3900		960
EXC-1	J1PW81	9/18/2012	1800	J	680	6300		990
EXC-2	J1PW82	9/18/2012	1900	J	680	4600		1000
EXC-4	J1RJ77	3/15/2013	4100		680	5400		1000
EXC-5	J1PW85	9/18/2012	5300		670	16000		980
EXC-6	J1PW86	9/18/2012	2200	J	650	2900	J	960
EXC-7	J1PW87	9/18/2012	1600	J	670	2200	J	990
EXC-8	J1PW88	9/18/2012	770	J	690	1000	U	1000
EXC-9	J1PW89	9/18/2012	1100	J	670	1200	J	990
EXC-10	J1PW90	9/18/2012	670	U	670	990	U	990
EXC-11	J1PW91	9/18/2012	1000	J	630	1100	J	920
EXC-12	J1PW92	9/18/2012	660	U	660	2300	J	970

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	TPH - Diesel ug/kg	TPH - Diesel EXT ug/kg
EXC-3	J1PW83/J1PW93	9/18/2012	13500	17950
EXC-1	J1PW81	9/18/2012	1800	6300
EXC-2	J1PW82	9/18/2012	1900	4600
EXC-4	J1RJ77	3/15/2013	4100	5400
EXC-5	J1PW85	9/18/2012	5300	16000
EXC-6	J1PW86	9/18/2012	2200	2900
EXC-7	J1PW87	9/18/2012	1600	2200
EXC-8	J1PW88	9/18/2012	770	500
EXC-9	J1PW89	9/18/2012	1100	1200
EXC-10	J1PW90	9/18/2012	335	495
EXC-11	J1PW91	9/18/2012	1000	1100
EXC-12	J1PW92	9/18/2012	330	2300

Statistical Computations

	TPH - Diesel		TPH - Diesel EXT	
95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.		Large data set (n ≥ 10), use MTCAStat lognormal distribution.	
N	12		12	
% < Detection limit	17%		17%	
Mean	2828		5079	
Standard deviation	3674		5880	
95% UCL on mean	7899		18110	
Maximum value	24000		32000	
Most Stringent Cleanup Limit for nonradionuclide and RAG type (ug/kg)	200000	GW & River Protection	200000	GW & River Protection
WAC 173-340 3-PART TEST				
95% UCL > Cleanup Limit?	NO		NO	
> 10% above Cleanup Limit?	NO		NO	
Any sample > 2X Cleanup Limit?	NO		NO	
WAC 173-340 Compliance?	The data set meets the 3-part test criteria when compared to the most stringent RAG.		The data set meets the 3-part test criteria when compared to the most stringent RAG.	

Qualifiers are defined on page 3.

MAXIMUM VALUE 3-PART TEST CALCULATION SHEET

Washington Closure Hanford

Originator	N. K. Schiffern NO	Date	07/01/13	Calc. No.	0100D-CA-V0508
Project	100-D Field Remediation	Job No.	14655	Checked	J. D. Skoglie JS
Subject	100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Cleanup Verification 95% UCL Calculations	Rev. No.	0	Date	07/01/13
				Sheet No.	9 of 24

1 **100-D-77, 100-D-62, and 100-D-83:1 Maximum Calculations**

2 **Verification Data -Excavation (EXC)**

3	Sample	Sample	Sample	Antimony			Boron			Cadmium			Chloride		
4	Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
5	EXC-3	J1PW83	9/18/2012	0.40	BJ	0.37	0.96	U	0.96	0.040	U	0.040	1.9	U	1.9
6	Duplicate of J1PW83	J1PW93	9/18/2012	0.35	UJ	0.35	0.91	U	0.91	0.038	U	0.038	1.8	U	1.8
7	EXC-1	J1PW81	9/18/2012	0.36	UJ	0.36	1.3	B	0.92	0.062	B	0.038	1.9	U	1.9
8	EXC-2	J1PW82	9/18/2012	0.34	UJ	0.34	0.92	B	0.87	0.036	U	0.036	4.8	B	1.9
9	EXC-4	J1RJ77	3/15/2013	0.36	U	0.36	0.93	U	0.93	0.039	U	0.039	2.7	B	2.0
10	EXC-5	J1PW85	9/18/2012	0.33	UJ	0.33	0.84	U	0.84	0.035	U	0.035	2.0	U	2.0
11	EXC-6	J1PW86	9/18/2012	0.34	UJ	0.34	0.87	U	0.87	0.037	U	0.037	3.8	B	1.9
12	EXC-7	J1PW87	9/18/2012	0.32	UJ	0.32	0.82	U	0.82	0.034	U	0.034	2.0	U	2.0
13	EXC-8	J1PW88	9/18/2012	0.34	UJ	0.34	0.88	U	0.88	0.037	U	0.037	2.0	U	2.0
14	EXC-9	J1PW89	9/18/2012	0.36	UJ	0.36	0.92	U	0.92	0.038	U	0.038	1.9	U	1.9
15	EXC-10	J1PW90	9/18/2012	0.36	UJ	0.36	0.93	U	0.93	0.039	U	0.039	1.9	U	1.9
16	EXC-11	J1PW91	9/18/2012	0.38	UJ	0.38	0.98	U	0.98	0.041	U	0.041	1.9	U	1.9
17	EXC-12	J1PW92	9/18/2012	0.33	UJ	0.33	0.84	U	0.84	0.035	U	0.035	1.9	U	1.9

3	Sample	Fluoride			Acenaphthene (Method 8310)			Acenaphthylene (Method 8310)			Anthracene (Method 8310)		
4	Area	mg/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
5	EXC-3	0.80	U	0.80	190	NX	10	13	JX	9.0	390	N	3.0
6	Duplicate of J1PW83	0.77	U	0.77	100		9.2	8.3	U	8.3	2.8	U	2.8
7	EXC-1	0.92	BN	0.81	9.8	U	9.8	8.8	U	8.8	3.0	U	3.0
8	EXC-2	0.80	U	0.80	10	U	10	9.0	U	9.0	3.1	U	3.1
9	EXC-4	0.83	U	0.83	10	U	10	9.2	U	9.2	7.5	J	3.1
10	EXC-5	0.82	U	0.82	10	U	10	9.0	U	9.0	22		3.1
11	EXC-6	0.80	U	0.80	10	U	10	9.0	U	9.0	3.1	U	3.1
12	EXC-7	0.83	U	0.83	9.7	U	9.7	8.7	U	8.7	3.0	U	3.0
13	EXC-8	0.83	U	0.83	9.8	U	9.8	8.8	U	8.8	3.0	U	3.0
14	EXC-9	0.78	U	0.78	10	U	10	9.0	U	9.0	3.0	U	3.0
15	EXC-10	0.77	U	0.77	10	U	10	9.0	U	9.0	3.0	U	3.0
16	EXC-11	0.79	U	0.79	9.4	U	9.4	8.4	U	8.4	2.9	U	2.9
17	EXC-12	0.83	B	0.80	9.4	U	9.4	8.4	U	8.4	2.9	U	2.9

18 **Statistical Computations**

19		Antimony		Boron		Cadmium		Chloride	
20	% < Detection limit	92%		83%		92%		75%	
21	Maximum value	0.40		1.3		0.062		4.8	
22	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless otherwise noted**	5	GW & River Protection	320	GW Protection	0.81	GW & River Protection	25000	GW Protection
23	**3-PART TEST**								
24	Maximum > Cleanup Limit?	NA		NO		NA		NA	
25	> 10% above Cleanup Limit?	NA		NO		NA		NA	
26	Any sample > 2X Cleanup Limit?	NA		NO		NA		NA	
27	**3-Part Test Compliance?**	Because all values are below background (5 mg/kg) the WAC 173-340 3-part test is not required.		The data set meets the 3-part test criteria when compared to the most stringent RAG.		Because all values are below background (0.81 mg/kg) the WAC 173-340 3-part test is not required.		Because all values are below background (100 mg/kg) the WAC 173-340 3-part test is not required.	

19		Fluoride		Acenaphthene (Method 8310)		Acenaphthylene (Method 8310)		Anthracene (Method 8310)	
20	% < Detection limit	83%		92%		92%		75%	
21	Maximum value	0.92		190		13		390	
22	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless otherwise noted**	96	GW Protection	96000 ug/kg	GW Protection	96000 ug/kg	GW Protection	240000 ug/kg	GW Protection
23	**3-PART TEST**								
24	Maximum > Cleanup Limit?	NA		NO		NO		NO	
25	> 10% above Cleanup Limit?	NA		NO		NO		NO	
26	Any sample > 2X Cleanup Limit?	NA		NO		NO		NO	
27	**3-Part Test Compliance?**	Because all values are below background (2.81 mg/kg) the WAC 173-340 3-part test is not required.		The data set meets the 3-part test criteria when compared to the most stringent RAG.		The data set meets the 3-part test criteria when compared to the most stringent RAG.		The data set meets the 3-part test criteria when compared to the most stringent RAG.	

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29	Sample	Sample	Sample	Benzo(a)anthracene (Method 8310)			Benzo(a)pyrene (Method 8310)			Benzo(b)fluoranthene (Method 8310)			Benzo(ghi)perylene (Method 8310)		
30	Area	Number	Date	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
31	EXC-3	J1PW83	9/18/2012	660	N	3.2	440	N	6.4	500	N	4.2	320	N	7.2
32	Duplicate of J1PW83	J1PW93	9/18/2012	160		2.9	80		5.9	120		3.9	65		6.6
33	EXC-1	J1PW81	9/18/2012	3.1	U	3.1	6.3	U	6.3	4.1	U	4.1	7.0	U	7.0
34	EXC-2	J1PW82	9/18/2012	4.9	JX	3.2	7.2	JX	6.4	11	J	4.2	7.2	U	7.2
35	EXC-4	J1RJ77	3/15/2013	26		3.3	23		6.6	25		4.3	11	JX	7.4
36	EXC-5	J1PW85	9/18/2012	58		3.2	6.4	U	6.4	51		4.2	45	X	7.2
37	EXC-6	J1PW86	9/18/2012	3.2	U	3.2	6.4	U	6.4	4.2	U	4.2	7.2	U	7.2
38	EXC-7	J1PW87	9/18/2012	3.1	U	3.1	6.2	U	6.2	4.1	U	4.1	7.0	U	7.0
39	EXC-8	J1PW88	9/18/2012	3.1	U	3.1	6.3	U	6.3	4.1	U	4.1	7.0	U	7.0
40	EXC-9	J1PW89	9/18/2012	3.2	U	3.2	6.4	U	6.4	6.7	JX	4.2	7.2	U	7.2
41	EXC-10	J1PW90	9/18/2012	3.2	U	3.2	6.4	U	6.4	4.2	U	4.2	7.2	U	7.2
42	EXC-11	J1PW91	9/18/2012	3.0	U	3.0	6.0	U	6.0	3.9	U	3.9	6.7	U	6.7
43	EXC-12	J1PW92	9/18/2012	3.0	U	3.0	6.0	U	6.0	3.9	U	3.9	6.8	U	6.8

29	Sample	Benzo(k)fluoranthene (Method 8310)			Chrysene (Method 8310)			Dibenz(a,h)anthracene (Method 8310)			Fluoranthene (Method 8310)		
30	Area	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
31	EXC-3	180	N	3.9	560	N	4.8	92	X	11	1200	N	13
32	Duplicate of J1PW83	41		3.6	130		4.4	15	JX	10	240		12
33	EXC-1	3.9	U	3.9	4.7	U	4.7	11	U	11	13	U	13
34	EXC-2	4.0	U	4.0	7.9	JX	4.9	11	U	11	16	J	13
35	EXC-4	9.1	J	4.0	23	J	5.0	11	U	11	57		13
36	EXC-5	17		3.9	49		4.8	11	U	11	99		13
37	EXC-6	3.9	U	3.9	4.9	U	4.9	11	U	11	13	U	13
38	EXC-7	3.8	U	3.8	4.7	U	4.7	11	U	11	13	U	13
39	EXC-8	3.9	U	3.9	4.7	U	4.7	11	U	11	13	U	13
40	EXC-9	3.9	U	3.9	9.8	JX	4.8	11	U	11	15	J	13
41	EXC-10	3.9	U	3.9	4.8	U	4.8	11	U	11	13	U	13
42	EXC-11	3.7	U	3.7	4.5	U	4.5	10	U	10	12	U	12
43	EXC-12	3.7	U	3.7	4.5	U	4.5	10	U	10	12	U	12

44 **Statistical Computations**

45		Benzo(a)anthracene (Method 8310)		Benzo(a)pyrene (Method 8310)		Benzo(b)fluoranthene (Method 8310)		Benzo(ghi)perylene (Method 8310)	
46	% < Detection limit	67%		82%		58%		75%	
47	Maximum value	660		23		500		320	
48	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (ug/kg)**	15	GW & River Protection	15	GW & River Protection	15	GW & River Protection	48000	GW Protection
49	**3-PART TEST**								
50	Maximum > Cleanup Limit?	YES		YES		YES		NO	
51	> 10% above Cleanup Limit?	YES		YES		YES		NO	
52	Any sample > 2X Cleanup Limit?	YES		NO		YES		NO	
53	**3-Part Test Compliance?**	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.		A detailed assessment will be performed. The data set does not meet the 3-part test criteria when compared to the direct exposure RAG.		A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.		The data set meets the 3-part test criteria when compared to the most stringent RAG.	

45		Benzo(k)fluoranthene (Method 8310)		Chrysene (Method 8310)		Dibenz(a,h)anthracene (Method 8310)		Fluoranthene (Method 8310)	
46	% < Detection limit	75%		58%		92%		58%	
47	Maximum value	180		560		92		1200	
48	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (ug/kg)**	15	GW & River Protection	100	River Protection	30	GW & River Protection	18000	River Protection
49	**3-PART TEST**								
50	Maximum > Cleanup Limit?	YES		YES		YES		NO	
51	> 10% above Cleanup Limit?	YES		YES		NO		NO	
52	Any sample > 2X Cleanup Limit?	YES		YES		YES		NO	
53	**3-Part Test Compliance?**	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.		A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.		A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.		A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	

54 Qualifiers are defined on page 3.

MAXIMUM VALUE 3-PART TEST CALCULATION SHEET

Washington Closure Hanford

Originator: N. K. Schiffern | Date: 07/01/13 | Calc. No.: 0100D-CA-V0508 | Rev. No.: 0
Project: 100-D Field Remediation | Job No.: 14655 | Checked: J. D. Skoglie | Date: 07/01/13
Subject: 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Cleanup Verification 95% UCL Calculations | Sheet No.: 10 of 24

100-D-77, 100-D-62, and 100-D-83:1 Maximum Calculations

Verification Data -Excavation (EXC)

Sample Area	Sample Number	Sample Date	Fluorene (Method 8310)			Indeno(1,2,3-cd)pyrene (Method 8310)			Phenanthrene (Method 8310)			Pyrene (Method 8310)		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
EXC-3	J1PW83	9/18/2012	250		5.3	300	N	12	1200	N	12	1300	N	12
Duplicate of J1PW83	J1PW93	9/18/2012	71		4.8	43	X	11	260		11	210		11
EXC-1	J1PW81	9/18/2012	5.2	U	5.2	12	U	12	12	U	12	12	U	12
EXC-2	J1PW82	9/18/2012	5.3	U	5.3	12	U	12	12	U	12	18	J	12
EXC-4	J1RJ77	3/15/2013	5.4	U	5.4	15	J	12	24	J	12	61		12
EXC-5	J1PW85	9/18/2012	13	J	5.3	31		12	51		12	110		12
EXC-6	J1PW86	9/18/2012	5.3	U	5.3	12	U	12	12	U	12	12	U	12
EXC-7	J1PW87	9/18/2012	5.1	U	5.1	12	U	12	12	U	12	12	U	12
EXC-8	J1PW88	9/18/2012	5.2	U	5.2	12	U	12	12	U	12	12	U	12
EXC-9	J1PW89	9/18/2012	5.3	U	5.3	12	U	12	12	U	12	19	J	12
EXC-10	J1PW90	9/18/2012	5.3	U	5.3	12	U	12	12	U	12	12	U	12
EXC-11	J1PW91	9/18/2012	4.9	U	4.9	11	U	11	11	U	11	11	U	11
EXC-12	J1PW92	9/18/2012	5.0	U	5.0	11	U	11	11	U	11	11	U	11

Sample Area	Sample Number	Sample Date	Acenaphthene (method 8270)			Acenaphthylene (method 8270)			Anthracene (method 8270)			Benzo(a)anthracene (method 8270)		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
EXC-3	J1PW83	9/18/2012	390		9.9	120	J	16	1000		16	1800		19
Duplicate of J1PW83	J1PW93	9/18/2012	35	J	10	17	U	17	73	J	17	150	J	20
EXC-1	J1PW81	9/18/2012	9.9	U	9.9	16	U	16	16	U	16	19	U	19
EXC-2	J1PW82	9/18/2012	10	U	10	17	U	17	17	U	17	24	J	19
EXC-4	J1RJ77	3/15/2013	10	U	10	17	U	17	17	U	17	42	J	20
EXC-5	J1PW85	9/18/2012	10	U	10	16	U	16	16	U	16	49	J	19
EXC-6	J1PW86	9/18/2012	10	U	10	17	U	17	17	U	17	20	U	20
EXC-7	J1PW87	9/18/2012	10	U	10	17	U	17	17	U	17	20	U	20
EXC-8	J1PW88	9/18/2012	10	U	10	17	U	17	17	U	17	20	U	20
EXC-9	J1PW89	9/18/2012	10	U	10	16	U	16	16	U	16	19	U	19
EXC-10	J1PW90	9/18/2012	9.7	U	9.7	16	U	16	16	U	16	19	U	19
EXC-11	J1PW91	9/18/2012	10	U	10	17	U	17	17	U	17	20	U	20
EXC-12	J1PW92	9/18/2012	10	U	10	17	U	17	17	U	17	20	U	20

Statistical Computations

	Fluorene (Method 8310)	Indeno(1,2,3-cd)pyrene (Method 8310)	Phenanthrene (Method 8310)	Pyrene (Method 8310)	Acenaphthene (method 8270)	Acenaphthylene (method 8270)	Anthracene (method 8270)	Benzo(a)anthracene (method 8270)
% < Detection limit	83%	75%	75%	58%	92%	92%	92%	67%
Maximum value	250	300	1200	1300	390	120	1000	1800
Most Stringent Cleanup Limit for nonradionuclide and RAG type (ug/kg)	64000	15	240000	48000	96000	96000	240000	330
	GW Protection	GW & River Protection	GW Protection	GW Protection	GW Protection	GW Protection	GW Protection	GW & River Protection
3-PART TEST								
Maximum > Cleanup Limit?	NO	YES	NO	NO	NO	NO	NO	YES
> 10% above Cleanup Limit?	NO	YES	NO	NO	NO	NO	NO	NO
Any sample > 2X Cleanup Limit?	NO	YES	NO	NO	NO	NO	NO	YES
3-Part Test Compliance?	The data set meets the 3-part test criteria when compared to the most stringent RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	A detailed assessment will be performed. The data set does not meet the 3-part test criteria when compared to the direct exposure RAG.

Sample Area	Sample Number	Sample Date	Benzo(a)pyrene (method 8270)			Benzo(b)fluoranthene (method 8270)			Benzo(ghi)perylene (method 8270)			Chrysene (method 8270)		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
EXC-3	J1PW83	9/18/2012	1100		19	2100		25	620		15	1800		26
Duplicate of J1PW83	J1PW93	9/18/2012	110	J	20	200	J	26	62	J	16	170	J	27
EXC-1	J1PW81	9/18/2012	19	U	19	25	U	25	15	U	15	26	U	26
EXC-2	J1PW82	9/18/2012	22	J	19	40	J	25	16	U	16	26	U	26
EXC-4	J1RJ77	3/15/2013	36	J	20	68	JX	27	20	J	16	50	J	27
EXC-5	J1PW85	9/18/2012	47	J	19	79	J	25	32	J	15	42	J	26
EXC-6	J1PW86	9/18/2012	20	U	20	26	U	26	16	U	16	27	U	27
EXC-7	J1PW87	9/18/2012	20	U	20	26	U	26	16	U	16	27	U	27
EXC-8	J1PW88	9/18/2012	20	U	20	27	U	27	16	U	16	27	U	27
EXC-9	J1PW89	9/18/2012	19	U	19	25	U	25	15	U	15	26	U	26
EXC-10	J1PW90	9/18/2012	19	U	19	25	U	25	15	U	15	25	U	25
EXC-11	J1PW91	9/18/2012	20	U	20	26	U	26	16	U	16	26	U	26
EXC-12	J1PW92	9/18/2012	20	U	20	26	U	26	16	U	16	26	U	26

Sample Area	Sample Number	Sample Date	Dibenz(a,h)anthracene (method 8270)			Fluoranthene (method 8270)			Fluorene (method 8270)			Indeno(1,2,3-cd)pyrene (method 8270)		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
EXC-3	J1PW83	9/18/2012	160	J	18	3700		34	580		17	550		21
Duplicate of J1PW83	J1PW93	9/18/2012	19	J	19	340		36	64	J	18	47	J	22
EXC-1	J1PW81	9/18/2012	18	U	18	35	U	35	17	U	17	21	U	21
EXC-2	J1PW82	9/18/2012	18	U	18	35	U	35	17	U	17	21	U	21
EXC-4	J1RJ77	3/15/2013	19	U	19	81	J	37	18	U	18	22	U	22
EXC-5	J1PW85	9/18/2012	18	U	18	79	J	35	17	U	17	24	J	21
EXC-6	J1PW86	9/18/2012	19	U	19	35	U	35	18	U	18	22	U	22
EXC-7	J1PW87	9/18/2012	19	U	19	35	U	35	18	U	18	22	U	22
EXC-8	J1PW88	9/18/2012	19	U	19	37	U	37	18	U	18	22	U	22
EXC-9	J1PW89	9/18/2012	18	U	18	35	U	35	17	U	17	21	U	21
EXC-10	J1PW90	9/18/2012	18	U	18	34	U	34	17	U	17	21	U	21
EXC-11	J1PW91	9/18/2012	19	U	19	35	U	35	18	U	18	22	U	22
EXC-12	J1PW92	9/18/2012	19	U	19	35	U	35	18	U	18	22	U	22

Statistical Computations

	Benzo(a)pyrene (method 8270)	Benzo(b)fluoranthene (method 8270)	Benzo(ghi)perylene (method 8270)	Chrysene (method 8270)	Dibenz(a,h)anthracene (method 8270)	Fluoranthene (method 8270)	Fluorene (method 8270)	Indeno(1,2,3-cd)pyrene (method 8270)
% < Detection limit	73%	67%	75%	75%	92%	75%	92%	83%
Maximum value	47	2100	620	1800	160	3700	580	550
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)	330	330	48000	330	330	18000	64000	330
	GW & River Protection	GW & River Protection	GW Protection	River Protection	GW & River Protection	River Protection	GW Protection	GW & River Protection
3-PART TEST								
Maximum > Cleanup Limit?	NO	YES	NO	YES	NO	NO	NO	YES
> 10% above Cleanup Limit?	NO	NO	NO	NO	NO	NO	NO	NO
Any sample > 2X Cleanup Limit?	NO	YES	NO	YES	NO	NO	NO	NO
3-Part Test Compliance?	The data set meets the 3-part test criteria when compared to the most stringent RAG.	A detailed assessment will be performed. The data set does not meet the 3-part test criteria when compared to the direct exposure RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	A detailed assessment will be performed. The data set meets the 3 part test criteria when compared to the direct exposure RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.

Qualifiers are defined on page 3.

MAXIMUM VALUE 3-PART TEST CALCULATION SHEET

Washington Closure Hanford

Originator	N. K. Schiffern	**Date**	07/01/13	**Calc. No.**	0100D-CA-V0508
Project	100-D Field Remediation	**Job No.**	14655	**Checked**	J. D. Skoglie
Subject	100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Cleanup Verification 95% UCL Calculations				

Rev. No. 0
Date 07/01/13
Sheet No. 11 of 24

1 **100-D-77, 100-D-62, and 100-D-83:1 Maximum Calculations**

2 **Verification Data -Excavation (EXC)**

3	Sample	Sample	Sample	Naphthalene (method 8270)			Phenanthrene (method 8270)			Pyrene (method 8270)			2-Methylnaphthalene		
4	Area	Number	Date	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
5	EXC-3	J1PW83	9/18/2012	170	J	30	3900		16	2900		12	120	J	18
6	Duplicate of J1PW83	J1PW93	9/18/2012	31	U	31	360		17	270	J	12	20	J	19
7	EXC-1	J1PW81	9/18/2012	30	U	30	16	U	16	12	U	12	18	U	18
8	EXC-2	J1PW82	9/18/2012	30	U	30	17	U	17	38	J	12	18	U	18
9	EXC-4	J1RJ77	3/15/2013	32	U	32	39	J	17	76	J	12	19	U	19
10	EXC-5	J1PW85	9/18/2012	30	U	30	39	J	16	73	J	12	18	U	18
11	EXC-6	J1PW86	9/18/2012	31	U	31	17	U	17	12	U	12	19	U	19
12	EXC-7	J1PW87	9/18/2012	31	U	31	17	U	17	12	U	12	19	U	19
13	EXC-8	J1PW88	9/18/2012	31	U	31	17	U	17	12	U	12	19	U	19
14	EXC-9	J1PW89	9/18/2012	30	U	30	16	U	16	12	U	12	18	U	18
15	EXC-10	J1PW90	9/18/2012	29	U	29	16	U	16	11	U	11	18	U	18
16	EXC-11	J1PW91	9/18/2012	30	U	30	17	U	17	12	U	12	19	U	19
17	EXC-12	J1PW92	9/18/2012	30	U	30	17	U	17	12	J	12	19	U	19

3	Sample	Sample	Sample	Carbazole			Dibenzofuran			Aroclor-1260		
4	Area	Number	Date	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
5	EXC-3	J1PW83	9/18/2012	570		34	340		19	2.4	U	2.4
6	Duplicate of J1PW83	J1PW93	9/18/2012	42	J	36	53	J	20	2.5	U	2.5
7	EXC-1	J1PW81	9/18/2012	35	U	35	19	U	19	5.4	J	2.5
8	EXC-2	J1PW82	9/18/2012	35	U	35	19	U	19	2.4	U	2.4
9	EXC-4	J1RJ77	3/15/2013	37	U	37	20	U	20	2.7	U	2.7
10	EXC-5	J1PW85	9/18/2012	35	U	35	19	U	19	7.5	JP	2.6
11	EXC-6	J1PW86	9/18/2012	35	U	35	20	U	20	2.5	U	2.5
12	EXC-7	J1PW87	9/18/2012	35	U	35	20	U	20	2.6	U	2.6
13	EXC-8	J1PW88	9/18/2012	37	U	37	20	U	20	2.6	U	2.6
14	EXC-9	J1PW89	9/18/2012	35	U	35	19	U	19	2.5	U	2.5
15	EXC-10	J1PW90	9/18/2012	34	U	34	19	U	19	2.4	U	2.4
16	EXC-11	J1PW91	9/18/2012	35	U	35	20	U	20	2.6	U	2.6
17	EXC-12	J1PW92	9/18/2012	35	U	35	20	U	20	2.6	U	2.6

18 **Statistical Computations**

19		Naphthalene (method 8270)	Phenanthrene (method 8270)	Pyrene (method 8270)	2-Methylnaphthalene	Carbazole	Dibenzofuran	Aroclor-1260
20	% < Detection limit	92%	75%	58%	92%	92%	92%	83%
21	Maximum value	170	3900	2900	120	570	340	7.5
22	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (ug/kg)**	16000 GW Protection	240000 GW Protection	48000 GW Protection	3200 GW Protection	438 GW Protection	3200 GW Protection	17 GW & River Protection
23	**3-PART TEST**							
24	Maximum > Cleanup Limit?	NO	NO	NO	NO	YES	NO	NO
25	> 10% above Cleanup Limit?	NO	NO	NO	NO	NO	NO	NO
26	Any sample > 2X Cleanup Limit?	NO	NO	NO	NO	NO	NO	NO
27	**3-Part Test Compliance?**	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.

28 Qualifiers are defined on page 3.

CALCULATION SHEET

Washington Closure Hanford			
Originator N. K. Schiffern NO	**Date** 07/01/13	**Calc. No.** 0100D-CA-V0508	**Rev. No.** 0
Project 100-N Field Remediation	**Job No.** 14655	**Checked** J. D. Skoglie JDS	**Date** 07/01/13
Subject 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Cleanup Verification 95% UCL Calculations			**Sheet No.** 12 of 24

1 **100-D-77, 100-D-62, and 100-D-83:1 Statistical Calculations**

2 **Verification Data -Staging Pile Area (SPA)**

	Sample Area	Sample Number	Sample Date	Arsenic			Barium			Beryllium			Cadmium		
3-4				mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
5	SPA-5	J1R645	4/8/2013	2.4		0.60	52.2	X	0.070	0.21		0.030	0.047	B	0.037
6	Duplicate of J1R645	J1R653	4/8/2013	2.3		0.60	43.9	X	0.069	0.21		0.030	0.043	B	0.037
7	SPA-1	J1R641	4/8/2013	2.5		0.58	52.0	X	0.067	0.23		0.029	0.070	B	0.036
8	SPA-2	J1R642	4/8/2013	2.7		0.61	63.0	X	0.070	0.23		0.031	0.074	B	0.038
9	SPA-3	J1R643	4/8/2013	2.4		0.60	53.0	X	0.069	0.24		0.030	0.042	B	0.037
10	SPA-4	J1R644	4/8/2013	1.6		0.68	43.5	X	0.078	0.16	B	0.034	0.044	B	0.042
11	SPA-6	J1R646	4/8/2013	2.3		0.68	58.1	X	0.078	0.22		0.034	0.067	B	0.042
12	SPA-7	J1R647	4/8/2013	2.0		0.63	44.4	X	0.073	0.20		0.032	0.049	B	0.039
13	SPA-8	J1RKM8	4/29/2013	2.2		0.60	59.6		0.069	0.030	U	0.030	0.15	B	0.037
14	SPA-9	J1RKM9	4/29/2013	2.4		0.60	53.8		0.069	0.030	B	0.030	0.16	B	0.037
15	SPA-10	J1RKM6	4/29/2013	2.7		0.65	53.5		0.075	0.057	B	0.033	0.14	B	0.040
16	SPA-11	J1RKM7	4/29/2013	2.6		0.63	60.2		0.073	0.068	B	0.032	0.15	B	0.039
17	SPA-12	J1RKM5	4/29/2013	2.2		0.63	58.7		0.072	0.031	U	0.031	0.15	B	0.039

	Sample Area	Sample Number	Sample Date	Chromium			Cobalt			Copper			Hexavalent Chromium		
3-4				mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
5	SPA-5	J1R645	4/8/2013	5.8	X	0.053	7.6	X	0.091	14.6	X	0.20	0.205		0.155
6	Duplicate of J1R645	J1R653	4/8/2013	6.0	X	0.053	7.1	X	0.091	14.0	X	0.20	0.226		0.155
7	SPA-1	J1R641	4/8/2013	7.9	XM	0.051	7.7	X	0.088	16.0	X	0.19	0.283		0.155
8	SPA-2	J1R642	4/8/2013	7.8	X	0.054	7.4	X	0.093	16.4	X	0.20	0.303		0.155
9	SPA-3	J1R643	4/8/2013	7.8	X	0.053	7.7	X	0.091	16.2	X	0.20	0.522		0.155
10	SPA-4	J1R644	4/8/2013	4.6	X	0.060	7.9	X	0.10	13.6	X	0.22	0.165		0.155
11	SPA-6	J1R646	4/8/2013	6.9	X	0.059	7.4	X	0.10	15.5	X	0.22	0.633		0.155
12	SPA-7	J1R647	4/8/2013	6.5	X	0.056	7.7	X	0.096	13.5	X	0.21	0.185		0.155
13	SPA-8	J1RKM8	4/29/2013	7.8		0.053	7.3	X	0.091	13.1		0.20	0.155	U	0.155
14	SPA-9	J1RKM9	4/29/2013	7.4		0.053	7.5	X	0.091	14.6		0.20	0.155	U	0.155
15	SPA-10	J1RKM6	4/29/2013	7.7		0.057	7.6	X	0.099	14.3		0.21	0.155	U	0.155
16	SPA-11	J1RKM7	4/29/2013	9.4		0.056	6.4	X	0.096	14.2		0.21	0.155	U	0.155
17	SPA-12	J1RKM5	4/29/2013	7.8		0.055	7.2	X	0.095	13.8		0.21	0.155	U	0.155

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19 **Statistical Computation Input Data**

20-21	Sample Area	Sample Number	Sample Date	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Copper mg/kg	Hexavalent Chromium mg/kg
22	SPA-5	J1R645/J1R653	4/8/2013	2.4	48.1	0.21	0.045	5.9	7.4	14.3	0.216
23	SPA-1	J1R641	4/8/2013	2.5	52.0	0.23	0.070	7.9	7.7	16.0	0.283
24	SPA-2	J1R642	4/8/2013	2.7	63.0	0.23	0.074	7.8	7.4	16.4	0.303
25	SPA-3	J1R643	4/8/2013	2.4	53.0	0.24	0.042	7.8	7.7	16.2	0.522
26	SPA-4	J1R644	4/8/2013	1.6	43.5	0.16	0.044	4.6	7.9	13.6	0.165
27	SPA-6	J1R646	4/8/2013	2.3	58.1	0.22	0.067	6.9	7.4	15.5	0.633
28	SPA-7	J1R647	4/8/2013	2.0	44.4	0.20	0.049	6.5	7.7	13.5	0.185
29	SPA-8	J1RKM8	4/29/2013	2.2	59.6	0.015	0.15	7.8	7.3	13.1	0.0775
30	SPA-9	J1RKM9	4/29/2013	2.4	53.8	0.030	0.16	7.4	7.5	14.6	0.0775
31	SPA-10	J1RKM6	4/29/2013	2.7	53.5	0.057	0.14	7.7	7.6	14.3	0.0775
32	SPA-11	J1RKM7	4/29/2013	2.6	60.2	0.068	0.15	9.4	6.4	14.2	0.0775
33	SPA-12	J1RKM5	4/29/2013	2.2	58.7	0.016	0.15	7.8	7.2	13.8	0.0775

34 **Statistical Computations**

35		Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Hexavalent Chromium
36	95% UCL based on	Large data set (n ≥ 10), use MTCAStat normal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.
37	N	12	12	12	12	12	12	12	12
38	% < Detection limit	0%	0%	17%	0%	0%	0%	0%	42%
39	Mean	2.3	54.0	0.14	0.095	7.3	7.4	14.6	0.225
40	Standard deviation	0.31	6.3	0.094	0.050	1.2	0.38	1.1	0.185
41	95% UCL on mean	2.5	57.6	0.18	0.12	7.9	7.6	15.2	0.313
42	Maximum value	2.7	63.0	0.24	0.16	9.4	7.9	16.4	0.633
43	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)**	20 DE, GW & River Protection	200 GW Protection	1.51 GW & River Protection	0.81 GW & River Protection	18.5 GW & River Protection	15.7 GW Protection	22.0 River Protection	2 River Protection
44	**WAC 173-340 3-PART TEST**								
45	95% UCL > Cleanup Limit?	NA	NA	NA	NA	NA	NA	NA	NO
46	> 10% above Cleanup Limit?	NA	NA	NA	NA	NA	NA	NA	NO
47	Any sample > 2X Cleanup Limit?	NA	NA	NA	NA	NA	NA	NA	NO
48	**WAC 173-340 Compliance?**	Because all values are below background (6.5 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (132 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (1.51 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (0.81 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (18.5 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (15.7 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (22.0 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.

49 Qualifiers are defined on page 3.

CALCULATION SHEET

Washington Closure Hanford

Originator N. K. Schiffern
Project 100-N Field Remediation
Subject 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Cleanup Verification 95% UCL Calculations

Date 07/01/13
Job No. 14655

Calc. No. 0100D-CA-V0508
Checked J. D. Skoglie

Rev. No. 0
Date 07/01/13
Sheet No. 13 of 24

100-D-77, 100-D-62, and 100-D-83:1 Statistical Calculations

Verification Data -Staging Pile Area (SPA)

Sample Area	Sample Number	Sample Date	Lead mg/kg	Lead Q	Lead PQL	Manganese mg/kg	Manganese Q	Manganese PQL	Mercury mg/kg	Mercury Q	Mercury PQL	Molybdenum mg/kg	Molybdenum Q	Molybdenum PQL	Nickel mg/kg	Nickel Q	Nickel PQL	Vanadium mg/kg	Vanadium Q	Vanadium PQL	Zinc mg/kg	Zinc Q	Zinc PQL	Chloride mg/kg	Chloride Q	Chloride PQL
SPA-5	J1R645	4/8/2013	3.5		0.25	260	X	0.091	0.0096	B	0.0058	0.24	U	0.24	9.5	X	0.11	52.6	X	0.086	38.5	X	0.36	5.9		2.0
Duplicate of J1R645	J1R653	4/8/2013	5.4		0.24	254	X	0.091	0.0088	B	0.0060	0.24	U	0.24	7.3	X	0.11	49.5	X	0.085	37.8	X	0.36	6.5		2.0
SPA-1	J1R641	4/8/2013	3.6		0.24	295	X	0.088	0.011	BM	0.0054	0.24	B	0.23	9.5	XM	0.11	51.1	X	0.083	44.5	X	0.35	3.1	B	2.0
SPA-2	J1R642	4/8/2013	5.6		0.25	280	X	0.093	0.043		0.0063	0.35	B	0.24	8.8	X	0.11	53.9	X	0.087	45.3	X	0.37	3.9	B	2.0
SPA-3	J1R643	4/8/2013	4.4		0.24	284	X	0.091	0.036		0.0064	0.46	B	0.24	8.2	X	0.11	55.2	X	0.085	51.3	X	0.36	7.3		2.1
SPA-4	J1R644	4/8/2013	2.0		0.28	264	X	0.10	0.0056	U	0.0056	0.27	U	0.27	7.1	X	0.13	58.0	X	0.097	39.4	X	0.41	2.9	B	2.0
SPA-6	J1R646	4/8/2013	7.1		0.28	273	X	0.10	0.022		0.0060	0.32	B	0.27	8.2	X	0.13	53.6	X	0.096	43.2	X	0.41	19.1		2.1
SPA-7	J1R647	4/8/2013	2.6		0.26	249	X	0.096	0.0055	U	0.0055	0.25	U	0.25	10.1	X	0.12	51.5	X	0.090	36.9	X	0.38	9.2		2.1
SPA-8	J1RKM8	4/29/2013	4.0		0.24	308	X	0.091	0.0054	U	0.0054	0.24	U	0.24	9.6	X	0.11	45.5		0.085	38.2	X	0.36	4.2	B	1.9
SPA-9	J1RKM9	4/29/2013	4.3		0.24	291	X	0.091	0.011	B	0.0051	0.24	U	0.24	10.0	X	0.11	45.4		0.085	39.6	X	0.36	4.1	B	2.0
SPA-10	J1RKM6	4/29/2013	3.9		0.27	292	X	0.099	0.0085	B	0.0059	0.33	B	0.26	9.9	X	0.12	46.2		0.093	36.2	X	0.39	14.1		1.9
SPA-11	J1RKM7	4/29/2013	3.5		0.26	265	X	0.096	0.0070	B	0.0062	0.25	U	0.25	12.9	X	0.12	40.0		0.090	33.5	X	0.38	4.3	B	2.0
SPA-12	J1RKM5	4/29/2013	3.4		0.26	273	X	0.095	0.0048	U	0.0048	0.33	B	0.25	10.9	X	0.12	46.8		0.089	37.3	X	0.38	4.2	BN	2.0

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Lead mg/kg	Manganese mg/kg	Mercury mg/kg	Molybdenum mg/kg	Nickel mg/kg	Vanadium mg/kg	Zinc mg/kg	Chloride mg/kg
SPA-5	J1R645/J1R653	4/8/2013	4.5	257	0.0092	0.12	8.4	51.1	38.2	6.2
SPA-1	J1R641	4/8/2013	3.6	295	0.011	0.24	9.5	51.1	44.5	3.1
SPA-2	J1R642	4/8/2013	5.6	280	0.043	0.35	8.8	53.9	45.3	3.9
SPA-3	J1R643	4/8/2013	4.4	284	0.036	0.46	8.2	55.2	51.3	7.3
SPA-4	J1R644	4/8/2013	2.0	264	0.0028	0.14	7.1	58.0	39.4	2.9
SPA-6	J1R646	4/8/2013	7.1	273	0.022	0.32	8.2	53.6	43.2	19.1
SPA-7	J1R647	4/8/2013	2.6	249	0.0028	0.13	10.1	51.5	36.9	9.2
SPA-8	J1RKM8	4/29/2013	4.0	308	0.0027	0.12	9.6	45.5	38.2	4.2
SPA-9	J1RKM9	4/29/2013	4.3	291	0.011	0.12	10.0	45.4	39.6	4.1
SPA-10	J1RKM6	4/29/2013	3.9	292	0.0085	0.33	9.9	46.2	36.2	14.1
SPA-11	J1RKM7	4/29/2013	3.5	265	0.0070	0.13	12.9	40.0	33.5	4.3
SPA-12	J1RKM5	4/29/2013	3.4	273	0.0024	0.33	10.9	46.8	37.3	4.2

Statistical Computations

	Lead	Manganese	Mercury	Molybdenum	Nickel	Vanadium	Zinc	Chloride
95% UCL based on	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.
N	12	12	12	12	12	12	12	12
% < Detection limit	0%	0%	33%	50%	0%	0%	0%	0%
Mean	4.1	278	0.013	0.23	9.5	49.9	40.3	6.9
Standard deviation	1.3	17.3	0.014	0.12	1.5	5.1	4.9	5.0
95% UCL on mean	5.0	287	0.034	0.29	10.3	52.8	43.0	9.3
Maximum value	7.1	308	0.043	0.46	12.9	58.0	51.3	19.1
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)	10.2 GW & River Protection	512 GW & River Protection	0.33 GW & River Protection	8 GW Protection	19.1 GW Protection	85.1 GW Protection	67.8 River Protection	25000 GW Protection
WAC 173-340 3-PART TEST								
95% UCL > Cleanup Limit?	NA	NA	NA	NO	NA	NA	NA	NA
> 10% above Cleanup Limit?	NA	NA	NA	NO	NA	NA	NA	NA
Any sample > 2X Cleanup Limit?	NA	NA	NA	NO	NA	NA	NA	NA
WAC 173-340 Compliance?	Because all values are below background (10.2 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (512 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (0.33 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (19.1 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (85.1 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (67.8 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (100 mg/kg) the WAC 173-340 3-part test is not required.

Qualifiers are defined on page 3.

Washington Closure Hanford — **CALCULATION SHEET**

Originator: N. K. Schiffern
Project: 100-D Field Remediation
Subject: 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Cleanup Verification 95% UCL Calculations

Date: 07/01/13
Job No.: 14655

Calc. No.: 0100D-CA-V0508
Checked: J. D. Skoglie

Rev. No.: 0
Date: 07/01/13
Sheet No.: 14 of 24

100-D-77, 100-D-62, and 100-D-83:1 Statistical Calculations

Verification Data -Staging Pile Area (SPA)

Sample Area	Sample Number	Sample Date	Nitrogen in Nitrate mg/kg	Q	PQL	Nitrogen in Nitrite and Nitrate mg/kg	Q	PQL	Sulfate mg/kg	Q	PQL	TPH - Diesel ug/kg	Q	PQL	TPH - Diesel EXT ug/kg	Q	PQL	Aroclor-1260 ug/kg	Q	PQL
SPA-5	J1R645	4/8/2013	1.2	B	0.32	0.85	C	0.31	11.4		1.8	3900	JB	700	5700	B	1000	2.6	U	2.6
Duplicate of J1R645	J1R653	4/8/2013	1.3	B	0.32	1.1	C	0.31	11.9		1.8	4500	B	670	6800	B	980	2.6	U	2.6
SPA-1	J1R641	4/8/2013	0.99	B	0.31	0.52	BMC	0.30	6.6		1.7	4500	B	700	7000	B	1000	2.6	J	2.5
SPA-2	J1R642	4/8/2013	1.7	B	0.32	1.4	C	0.31	9.9		1.8	6800	B	700	16000	B	1000	20		2.6
SPA-3	J1R643	4/8/2013	3.2		0.33	3.1		0.32	36.0		1.8	7400	B	710	17000	B	1000	14		2.7
SPA-4	J1R644	4/8/2013	0.90	B	0.32	0.48	BC	0.31	5.3		1.8	2200	JB	700	2700	JB	1000	2.6	U	2.6
SPA-6	J1R646	4/8/2013	1.9	B	0.34	1.8	C	0.32	10.6		1.9	6100	B	670	11000	B	990	3.9	J	2.6
SPA-7	J1R647	4/8/2013	0.94	B	0.33	0.48	BC	0.32	4.5	B	1.8	3200	JB	680	4900	B	1000	2.5	U	2.5
SPA-8	J1RKM8	4/29/2013	0.96	B	0.31	0.56	B	0.30	4.2	B	1.7	5400	B	660	11000	B	970	2.6	U	2.6
SPA-9	J1RKM9	4/29/2013	0.80	B	0.32	0.32	B	0.30	3.3	B	1.7	4200	B	660	9300	B	980	3.1	J	2.5
SPA-10	J1RKM6	4/29/2013	1.5	B	0.31	0.30	B	0.29	5.2		1.7	6100	B	670	13000	B	980	2.4	U	2.4
SPA-11	J1RKM7	4/29/2013	0.82	B	0.32	0.53	B	0.31	4.3	B	1.7	3100	JB	670	6800	B	990	14		2.6
SPA-12	J1RKM5	4/29/2013	0.99	BN	0.32	0.64	B	0.31	3.2	B	1.7	3200	JB	690	3800	JB	1000	2.6	U	2.6

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Nitrogen in Nitrate mg/kg	Nitrogen in Nitrite and Nitrate mg/kg	Sulfate mg/kg	TPH - Diesel ug/kg	TPH - Diesel EXT ug/kg	Aroclor-1260 ug/kg
SPA-5	J1R645/J1R653	4/8/2013	1.3	0.98	11.7	4200	6250	1.3
SPA-1	J1R641	4/8/2013	0.99	0.52	6.6	4500	7000	2.6
SPA-2	J1R642	4/8/2013	1.7	1.4	9.9	6800	16000	20
SPA-3	J1R643	4/8/2013	3.2	3.1	36.0	7400	17000	14
SPA-4	J1R644	4/8/2013	0.90	0.48	5.3	2200	2700	1.3
SPA-6	J1R646	4/8/2013	1.9	1.8	10.6	6100	11000	3.9
SPA-7	J1R647	4/8/2013	0.94	0.48	4.5	3200	4900	1.3
SPA-8	J1RKM8	4/29/2013	0.96	0.56	4.2	5400	11000	1.3
SPA-9	J1RKM9	4/29/2013	0.80	0.32	3.3	4200	9300	3.1
SPA-10	J1RKM6	4/29/2013	1.5	0.30	5.2	6100	13000	1.2
SPA-11	J1RKM7	4/29/2013	0.82	0.53	4.3	3100	6800	14
SPA-12	J1RKM5	4/29/2013	0.99	0.64	3.2	3200	3800	1.3

Statistical Computations

	Nitrogen in Nitrate	Nitrogen in Nitrite and Nitrate	Sulfate	TPH - Diesel	TPH - Diesel EXT	Aroclor-1260
95% UCL based on	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), use MTCAStat lognormal distribution.	Large data set (n ≥ 10), lognormal and normal distribution rejected, use z-statistic.
N	12	12	12	12	12	12
% < Detection limit	0%	0%	0%	0%	0%	50%
Mean	1.3	0.93	8.7	4700	9063	5.4
Standard deviation	0.69	0.82	9.1	1650	4642	6.6
95% UCL on mean	1.7	1.5	13.0	5933	13669	8.6
Maximum value	3.2	3.1	36.0	7400	17000	20
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless otherwise noted	1000 River Protection	1000 River Protection	25000 GW Protection	200000 ug/kg GW & River Protection	200000 ug/kg GW & River Protection	17 ug/kg GW & River Protection
WAC 173-340 3-PART TEST						
95% UCL > Cleanup Limit?	NA	NA	NA	NO	NO	NO
> 10% above Cleanup Limit?	NA	NA	NA	NO	NO	NO
Any sample > 2X Cleanup Limit?	NA	NA	NA	NO	NO	NO
WAC 173-340 Compliance?	Because all values are below background (11.8 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (11.8 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (237 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	The data set meets the 3-part test criteria when compared to the most stringent RAG.

Qualifiers are defined on page 3.

MAXIMUM VALUE 3-PART TEST CALCULATION SHEET

Washington Closure Hanford
Originator N. K. Schiffern
Project 100-D Field Remediation
Subject 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Cleanup Verification 95% UCL Calculations

Date 07/01/13
Job No. 14655

Calc. No. 0100D-CA-V0508
Checked J. D. Skoglie

Rev. No. 0
Date 07/01/13
Sheet No. 15 of 24

100-D-77, 100-D-62, and 100-D-83:1 Maximum Calculations

Verification Data -Staging Pile Area (SPA)

Sample	Sample	Sample	Antimony			Boron			Benzo(a)anthracene (Method 8310)			Benzo(a)pyrene (Method 8310)			Benzo(b)fluoranthene (Method 8310)			Benzo(ghi)perylene (Method 8310)			Benzo(k)fluoranthene (Method 8310)			Chrysene (Method 8310)		
Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
SPA-5	J1R645	4/8/2013	0.35	U	0.35	0.90	U	0.90	3.1	U	3.1	6.2	U	6.2	4.1	U	4.1	7.0	U	7.0	3.8	U	3.8	4.7	U	4.7
Duplicate of J1R645	J1R653	4/8/2013	0.34	U	0.34	0.89	U	0.89	3.1	U	3.1	6.2	U	6.2	4.1	U	4.1	7.0	U	7.0	3.8	U	3.8	4.7	U	4.7
SPA-1	J1R641	4/8/2013	0.34	U	0.34	0.92	BN	0.87	3.2	U	3.2	6.4	U	6.4	4.2	U	4.2	7.2	U	7.2	3.9	U	3.9	4.8	U	4.8
SPA-2	J1R642	4/8/2013	0.35	U	0.35	1.2	B	0.91	17	X	3.3	23		6.6	29	X	4.3	15	JX	7.4	8.6	J	4.0	20	J	4.9
SPA-3	J1R643	4/8/2013	0.34	U	0.34	0.89	U	0.89	6.7	J	3.3	6.7	U	6.7	4.8	J	4.4	7.5	U	7.5	4.1	U	4.1	8.3	J	5.1
SPA-4	J1R644	4/8/2013	0.39	U	0.39	1.0	U	1.0	3.1	U	3.1	6.2	U	6.2	4.1	U	4.1	7.0	U	7.0	3.8	U	3.8	4.7	U	4.7
SPA-6	J1R646	4/8/2013	0.39	U	0.39	1.0	U	1.0	18	X	3.3	33		6.6	33		4.3	25	J	7.4	9.0	J	4.0	28	J	5.0
SPA-7	J1R647	4/8/2013	0.36	U	0.36	0.94	U	0.94	3.1	U	3.1	6.3	U	6.3	4.1	U	4.1	7.1	U	7.1	3.9	U	3.9	4.8	U	4.8
SPA-8	J1RKM8	4/29/2013	0.51	B	0.34	0.89	U	0.89	3.2	U	3.2	6.5	U	6.5	4.3	U	4.3	7.3	U	7.3	4.0	U	4.0	4.9	U	4.9
SPA-9	J1RKM9	4/29/2013	0.54		0.34	0.89	U	0.89	3.2	U	3.2	6.4	U	6.4	4.2	U	4.2	7.2	U	7.2	3.9	U	3.9	4.8	U	4.8
SPA-10	J1RKM6	4/29/2013	0.57	B	0.37	0.97	U	0.97	3.2	U	3.2	6.4	U	6.4	4.2	U	4.2	7.1	U	7.1	3.9	U	3.9	4.8	U	4.8
SPA-11	J1RKM7	4/29/2013	0.53	B	0.36	0.94	U	0.94	3.2	U	3.2	6.3	U	6.3	4.2	U	4.2	7.1	U	7.1	3.9	U	3.9	4.8	U	4.8
SPA-12	J1RKM5	4/29/2013	0.87		0.36	0.93	U	0.93	3.2	U	3.2	6.4	U	6.4	4.2	U	4.2	7.2	U	7.2	3.9	U	3.9	5.0	J	4.8

Statistical Computations

	Antimony		Boron		Benzo(a)anthracene (Method 8310)		Benzo(a)pyrene (Method 8310)		Benzo(b)fluoranthene (Method 8310)		Benzo(ghi)perylene (Method 8310)		Benzo(k)fluoranthene (Method 8310)		Chrysene (Method 8310)	
% < Detection limit	58%		83%		75%		83%		75%		83%		83%		67%	
Maximum value	0.87		1.2		18		33		33		25		9.0		28	
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless otherwise noted	5	GW & River Protection	320	GW Protection	15 ug/kg	GW & River Protection	15 ug/kg	GW & River Protection	15 ug/kg	GW & River Protection	48000 ug/kg	GW Protection	15 ug/kg	GW & River Protection	100 ug/kg	River Protection
3-PART TEST																
Maximum > Cleanup Limit?	NA		NO		YES		YES		YES		NO		NO		NO	
> 10% above Cleanup Limit?	NA		NO		YES		YES		YES		NO		NO		NO	
Any sample > 2X Cleanup Limit?	NA		NO		NO		YES		YES		NO		NO		NO	
3-Part Test Compliance?	Because all values are below background (5 mg/kg) the WAC 173-340 3-part test is not required.		The data set meets the 3-part test criteria when compared to the most stringent RAG.		A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.		A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.		A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.		The data set meets the 3-part test criteria when compared to the most stringent RAG.		The data set meets the 3-part test criteria when compared to the most stringent RAG.		The data set meets the 3-part test criteria when compared to the most stringent RAG.	

Sample	Sample	Sample	Fluoranthene (Method 8310)			Indeno(1,2,3-cd)pyrene (Method 8310)			Pyrene (Method 8310)			Benzo(a)anthracene (method 8270)			Benzo(a)pyrene (method 8270)			Benzo(b)fluoranthene (method 8270)			Benzo(ghi)perylene (method 8270)			Chrysene (method 8270)		
Area	Number	Date	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
SPA-5	J1R645	4/8/2013	13	U	13	12	U	12	12	U	12	21	U	21	21	U	21	27	U	27	16	U	16	28	U	28
Duplicate of J1R645	J1R653	4/8/2013	13	U	13	12	U	12	12	U	12	20	U	20	20	U	20	27	U	27	16	U	16	28	U	28
SPA-1	J1R641	4/8/2013	13	U	13	12	U	12	12	U	12	20	U	20	20	U	20	26	U	26	16	U	16	27	U	27
SPA-2	J1R642	4/8/2013	39	J	13	21	J	12	49		12	36	J	20	31	J	20	62	JX	27	23	J	16	38	J	27
SPA-3	J1R643	4/8/2013	14	U	14	13	U	13	14	JX	13	25	J	21	21	J	21	42	JX	27	17	U	17	28	U	28
SPA-4	J1R644	4/8/2013	13	U	13	12	U	12	12	U	12	20	U	20	20	U	20	26	U	26	16	U	16	27	U	27
SPA-6	J1R646	4/8/2013	46		13	18	J	12	60	X	12	33	J	20	32	J	20	64	JX	26	16	U	16	45	J	27
SPA-7	J1R647	4/8/2013	13	U	13	12	U	12	12	U	12	20	U	20	20	U	20	26	U	26	16	U	16	27	U	27
SPA-8	J1RKM8	4/29/2013	13	U	13	12	U	12	12	U	12	20	U	20	20	U	20	26	U	26	16	U	16	27	U	27
SPA-9	J1RKM9	4/29/2013	13	U	13	12	U	12	12	U	12	19	U	19	19	U	19	25	U	25	15	U	15	26	U	26
SPA-10	J1RKM6	4/29/2013	13	U	13	12	U	12	12	U	12	20	U	20	20	U	20	26	U	26	16	U	16	27	U	27
SPA-11	J1RKM7	4/29/2013	13	U	13	12	U	12	12	U	12	20	U	20	20	U	20	26	U	26	16	U	16	27	U	27
SPA-12	J1RKM5	4/29/2013	13	U	13	12	U	12	12	U	12	19	U	19	19	U	19	25	U	25	16	U	16	26	U	26

Statistical Computations

	Fluoranthene (Method 8310)		Indeno(1,2,3-cd)pyrene (Method 8310)		Pyrene (Method 8310)		Benzo(a)anthracene (method 8270)		Benzo(a)pyrene (method 8270)		Benzo(b)fluoranthene (method 8270)		Benzo(ghi)perylene (method 8270)		Chrysene (method 8270)	
% < Detection limit	83%		83%		75%		75%		75%		75%		92%		83%	
Maximum value	46		21		60		36		32		64		23		45	
Most Stringent Cleanup Limit for nonradionuclide and RAG type (ug/kg)	18000	River Protection	15	GW & River Protection	48000	GW Protection	330	GW & River Protection	330	GW & River Protection	330	GW & River Protection	48000	GW Protection	330	River Protection
3-PART TEST																
Maximum > Cleanup Limit?	NO		YES		NO		NO		NO		NO		NO		NO	
> 10% above Cleanup Limit?	NO		YES		NO		NO		NO		NO		NO		NO	
Any sample > 2X Cleanup Limit?	NO		NO		NO		NO		NO		NO		NO		NO	
3-Part Test Compliance?	The data set meets the 3-part test criteria when compared to the most stringent RAG.		A detailed assessment will be performed. The data set meets the 3-part test criteria when compared to the direct exposure RAG.		The data set meets the 3-part test criteria when compared to the most stringent RAG.		The data set meets the 3-part test criteria when compared to the most stringent RAG.		The data set meets the 3-part test criteria when compared to the most stringent RAG.		The data set meets the 3-part test criteria when compared to the most stringent RAG.		The data set meets the 3-part test criteria when compared to the most stringent RAG.		The data set meets the 3-part test criteria when compared to the most stringent RAG.	

Qualifiers are defined on page 3.

MAXIMUM VALUE 3-PART TEST CALCULATION SHEET

Washington Closure Hanford

Originator	N. K. Schiffern NKS	**Date**	07/01/13	**Calc. No.**	0100D-CA-V0508
Project	100-D Field Remediation	**Job No.**	14655	**Checked**	J. D. Skoglie JDS
Subject	100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Cleanup Verification 95% UCL Calculations				

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100-D-77, 100-D-62, and 100-D-83:1 Maximum Calculations

Verification Data -Staging Pile Area (SPA)

Sample Area	**Sample Number**	**Sample Date**	**Fluoranthene (method 8270)**			**Phenanthrene (method 8270)**			**Pyrene (method 8270)**		
			ug/kg	**Q**	**PQL**	**ug/kg**	**Q**	**PQL**	**ug/kg**	**Q**	**PQL**
SPA-5	J1R645	4/8/2013	37	U	37	17	U	17	12	U	12
Duplicate of J1R645	J1R653	4/8/2013	37	U	37	17	U	17	12	U	12
SPA-1	J1R641	4/8/2013	36	U	36	17	U	17	12	U	12
SPA-2	J1R642	4/8/2013	61	J	37	22	J	17	59	J	12
SPA-3	J1R643	4/8/2013	44	J	38	22	J	18	39	J	13
SPA-4	J1R644	4/8/2013	36	U	36	17	U	17	12	U	12
SPA-6	J1R646	4/8/2013	56	J	36	21	J	17	66	J	12
SPA-7	J1R647	4/8/2013	36	U	36	17	U	17	12	U	12
SPA-8	J1RKM8	4/29/2013	36	U	36	17	U	17	12	U	12
SPA-9	J1RKM9	4/29/2013	35	U	35	16	U	16	12	U	12
SPA-10	J1RKM6	4/29/2013	36	U	36	17	U	17	12	U	12
SPA-11	J1RKM7	4/29/2013	35	U	35	17	U	17	12	U	12
SPA-12	J1RKM5	4/29/2013	35	U	35	17	U	17	12	U	12

Statistical Computations

	Fluoranthene (method 8270)		**Phenanthrene (method 8270)**		**Pyrene (method 8270)**	
% < Detection limit	75%		75%		75%	
Maximum value	61		22		66	
Most Stringent Cleanup Limit for nonradionuclide and RAG type (ug/kg)	18000	River Protection	240000	GW Protection	48000	GW Protection
3-PART TEST						
Maximum > Cleanup Limit?	NO		NO		NO	
> 10% above Cleanup Limit?	NO		NO		NO	
Any sample > 2X Cleanup Limit?	NO		NO		NO	
3-Part Test Compliance?	The data set meets the 3-part test criteria when compared to the most stringent RAG.		The data set meets the 3-part test criteria when compared to the most stringent RAG.		The data set meets the 3-part test criteria when compared to the most stringent RAG.	

Qualifiers are defined on page 3.

CALCULATION SHEET

Washington Closure Hanford
Originator N. K. Schiffern NKS
Project 100-D Field Remediation
Subject 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Cleanup Verification 95% UCL Calculations

Date 07/01/13
Job No. 14655

Calc. No. 0100D-CA-V0508
Checked J. D. Skoglie JDS

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Ecology Software (MTCAStat) Results, 100-D-77, 100-D-62, and 100-D-83:1 Excavation (EXC)

Arsenic 95% UCL Calculation

DATA	ID
3.6	J1PW83/J1PW93
3.6	J1PW81
2.2	J1PW82
1.2	J1RJ77
3.1	J1PW85
2.6	J1PW86
2.3	J1PW87
1.9	J1PW88
2.3	J1PW89
2.5	J1PW90
1.9	J1PW91
2.2	J1PW92

Number of samples		Uncensored values	
Uncensored	12	Mean	2.4
Censored		Lognormal mean	2.5
Detection limit or PQL		Std. devn.	0.70
Method detection limit		Median	2.3
TOTAL	12	Min.	1.2
		Max.	3.6

Lognormal distribution? r-squared is: 0.922
Normal distribution? r-squared is: 0.939
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 2.9

Barium 95% UCL Calculation

DATA	ID
62.3	J1PW83/J1PW93
65.4	J1PW81
73.0	J1PW82
46.8	J1RJ77
68.3	J1PW85
73.7	J1PW86
60.4	J1PW87
42.1	J1PW88
55.2	J1PW89
56.7	J1PW90
53.3	J1PW91
62.8	J1PW92

Number of samples		Uncensored values	
Uncensored	12	Mean	60.0
Censored		Lognormal mean	60.1
Detection limit or PQL		Std. devn.	9.7
Method detection limit		Median	61.4
TOTAL	12	Min.	42.1
		Max.	73.7

Lognormal distribution? r-squared is: 0.957
Normal distribution? r-squared is: 0.978
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 66.0

Beryllium 95% UCL Calculation

DATA	ID
0.27	J1PW83/J1PW93
0.34	J1PW81
0.27	J1PW82
0.53	J1RJ77
0.34	J1PW85
0.33	J1PW86
0.32	J1PW87
0.33	J1PW88
0.35	J1PW89
0.37	J1PW90
0.32	J1PW91
0.26	J1PW92

Number of samples		Uncensored values	
Uncensored	12	Mean	0.34
Censored		Lognormal mean	0.34
Detection limit or PQL		Std. devn.	0.071
Method detection limit		Median	0.33
TOTAL	12	Min.	0.26
		Max.	0.53

Lognormal distribution? r-squared is: 0.835
Normal distribution? r-squared is: 0.754
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.37

Chromium 95% UCL Calculation

DATA	ID
13.2	J1PW83/J1PW93
11.1	J1PW81
8.3	J1PW82
4.8	J1RJ77
8.2	J1PW85
8.5	J1PW86
7.1	J1PW87
5.3	J1PW88
6.9	J1PW89
6.2	J1PW90
5.9	J1PW91
6.8	J1PW92

Number of samples		Uncensored values	
Uncensored	12	Mean	7.7
Censored		Lognormal mean	7.7
Detection limit or PQL		Std. devn.	2.4
Method detection limit		Median	7.0
TOTAL	12	Min.	4.8
		Max.	13.2

Lognormal distribution? r-squared is: 0.962
Normal distribution? r-squared is: 0.892
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 9.1

Cobalt 95% UCL Calculation

DATA	ID
6.1	J1PW83/J1PW93
7.9	J1PW81
7.8	J1PW82
10.8	J1RJ77
9.6	J1PW85
9.5	J1PW86
9.7	J1PW87
10.8	J1PW88
10.3	J1PW89
10.8	J1PW90
10.6	J1PW91
6.9	J1PW92

Number of samples		Uncensored values	
Uncensored	12	Mean	9.2
Censored		Lognormal mean	9.3
Detection limit or PQL		Std. devn.	1.6
Method detection limit		Median	9.7
TOTAL	12	Min.	6.1
		Max.	10.8

Lognormal distribution? r-squared is: 0.856
Normal distribution? r-squared is: 0.880
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 10.0

Copper 95% UCL Calculation

DATA	ID
14.1	J1PW83/J1PW93
17.9	J1PW81
15.5	J1PW82
14.0	J1RJ77
16.3	J1PW85
14.5	J1PW86
15.7	J1PW87
15.2	J1PW88
16.2	J1PW89
16.8	J1PW90
14.9	J1PW91
16.2	J1PW92

Number of samples		Uncensored values	
Uncensored	12	Mean	15.6
Censored		Lognormal mean	15.6
Detection limit or PQL		Std. devn.	1.2
Method detection limit		Median	15.6
TOTAL	12	Min.	14.0
		Max.	17.9

Lognormal distribution? r-squared is: 0.974
Normal distribution? r-squared is: 0.969
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 16.2

Lead 95% UCL Calculation

DATA	ID
4.0	J1PW83/J1PW93
18.5	J1PW81
7.4	J1PW82
2.2	J1RJ77
9.1	J1PW85
4.1	J1PW86
3.3	J1PW87
3.3	J1PW88
4.6	J1PW89
4.6	J1PW90
3.8	J1PW91
3.9	J1PW92

Number of samples		Uncensored values	
Uncensored	12	Mean	5.7
Censored		Lognormal mean	5.6
Detection limit or PQL		Std. devn.	4.4
Method detection limit		Median	4.0
TOTAL	12	Min.	2.2
		Max.	18.5

Lognormal distribution? r-squared is: 0.854
Normal distribution? r-squared is: 0.640
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 7.8

Manganese 95% UCL Calculation

DATA	ID
288	J1PW83/J1PW93
330	J1PW81
305	J1PW82
323	J1RJ77
321	J1PW85
320	J1PW86
305	J1PW87
324	J1PW88
318	J1PW89
388	J1PW90
322	J1PW91
271	J1PW92

Number of samples		Uncensored values	
Uncensored	12	Mean	318
Censored		Lognormal mean	318
Detection limit or PQL		Std. devn.	28.0
Method detection limit		Median	321
TOTAL	12	Min.	271
		Max.	388

Lognormal distribution? r-squared is: 0.849
Normal distribution? r-squared is: 0.824
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 331

Mercury 95% UCL Calculation

DATA	ID
0.0071	J1PW83/J1PW93
0.14	J1PW81
0.075	J1PW82
0.013	J1RJ77
0.092	J1PW85
0.022	J1PW86
0.0055	J1PW87
0.0062	J1PW88
0.027	J1PW89
0.0089	J1PW90
0.0032	J1PW91
0.020	J1PW92

Number of samples		Uncensored values	
Uncensored	12	Mean	0.035
Censored		Lognormal mean	0.037
Detection limit or PQL		Std. devn.	0.044
Method detection limit		Median	0.017
TOTAL	12	Min.	0.0032
		Max.	0.14

Lognormal distribution? r-squared is: 0.956
Normal distribution? r-squared is: 0.734
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.12

Qualifiers are defined on page 3.

CALCULATION SHEET

Washington Closure Hanford
Originator N. K. Schiffern
Project 100-D Field Remediation
Subject 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Cleanup Verification 95% UCL Calculations

Date 07/01/13
Job No. 14655

Calc. No. 0100D-CA-V0508
Checked J. D. Skoglie

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Ecology Software (MTCAStat) Results, 100-D-77, 100-D-62, and 100-D-83:1 Excavation (EXC)

Molybdenum 95% UCL Calculation

DATA	ID
0.19	J1PW83/J1PW93
0.60	J1PW81
0.54	J1PW82
0.38	J1RJ77
0.48	J1PW85
0.31	J1PW86
0.29	J1PW87
0.33	J1PW88
0.26	J1PW89
0.27	J1PW90
0.31	J1PW91
0.28	J1PW92

Number of samples		Uncensored values	
Uncensored	12	Mean	0.35
Censored		Lognormal mean	0.35
Detection limit or PQL		Std. devn.	0.12
Method detection limit		Median	0.31
TOTAL	12	Min.	0.19
		Max.	0.60

Lognormal distribution? r-squared is: 0.942
Normal distribution? r-squared is: 0.890
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.43

Nickel 95% UCL Calculation

DATA	ID
12.6	J1PW83/J1PW93
13.1	J1PW81
11.9	J1PW82
10.0	J1RJ77
12.2	J1PW85
14.7	J1PW86
12.5	J1PW87
11.0	J1PW88
12.1	J1PW89
14.5	J1PW90
13.5	J1PW91
10.3	J1PW92

Number of samples		Uncensored values	
Uncensored	12	Mean	12.4
Censored		Lognormal mean	12.4
Detection limit or PQL		Std. devn.	1.5
Method detection limit		Median	12.4
TOTAL	12	Min.	10.0
		Max.	14.7

Lognormal distribution? r-squared is: 0.969
Normal distribution? r-squared is: 0.974
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 13.2

Vanadium 95% UCL Calculation

DATA	ID
41.0	J1PW83/J1PW93
54.9	J1PW81
65.0	J1PW82
75.3	J1RJ77
71.8	J1PW85
71.6	J1PW86
71.2	J1PW87
84.8	J1PW88
73.9	J1PW89
75.0	J1PW90
85.4	J1PW91
58.0	J1PW92

Number of samples		Uncensored values	
Uncensored	12	Mean	69.0
Censored		Lognormal mean	69.2
Detection limit or PQL		Std. devn.	12.6
Method detection limit		Median	71.7
TOTAL	12	Min.	41.0
		Max.	85.4

Lognormal distribution? r-squared is: 0.855
Normal distribution? r-squared is: 0.912
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 75.5

Zinc 95% UCL Calculation

DATA	ID
34.9	J1PW83/J1PW93
65.7	J1PW81
48.8	J1PW82
47.4	J1RJ77
53.5	J1PW85
42.9	J1PW86
41.5	J1PW87
44.6	J1PW88
44.7	J1PW89
45.2	J1PW90
45.3	J1PW91
39.6	J1PW92

Number of samples		Uncensored values	
Uncensored	12	Mean	46.2
Censored		Lognormal mean	46.2
Detection limit or PQL		Std. devn.	7.7
Method detection limit		Median	45.0
TOTAL	12	Min.	34.9
		Max.	65.7

Lognormal distribution? r-squared is: 0.910
Normal distribution? r-squared is: 0.857
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 50.3

Nitrogen in Nitrate 95% UCL Calculation

DATA	ID
0.62	J1PW83/J1PW93
0.77	J1PW81
2.6	J1PW82
0.71	J1RJ77
1.0	J1PW85
0.95	J1PW86
0.84	J1PW87
0.49	J1PW88
0.58	J1PW89
0.57	J1PW90
0.15	J1PW91
1.7	J1PW92

Number of samples		Uncensored values	
Uncensored	12	Mean	0.92
Censored		Lognormal mean	0.95
Detection limit or PQL		Std. devn.	0.65
Method detection limit		Median	0.74
TOTAL	12	Min.	0.15
		Max.	2.6

Lognormal distribution? r-squared is: 0.897
Normal distribution? r-squared is: 0.781
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 1.2

Nitrogen in Nitrite and Nitrate 95% UCL Calculation

DATA	ID
1.3	J1PW83/J1PW93
1.6	J1PW81
3.3	J1PW82
0.15	J1RJ77
7.8	J1PW85
1.4	J1PW86
1.3	J1PW87
1.0	J1PW88
1.1	J1PW89
1.2	J1PW90
1.2	J1PW91
2.6	J1PW92

Number of samples		Uncensored values	
Uncensored	12	Mean	2.0
Censored		Lognormal mean	2.1
Detection limit or PQL		Std. devn.	2.0
Method detection limit		Median	1.3
TOTAL	12	Min.	0.15
		Max.	7.8

Lognormal distribution? r-squared is: 0.819
Normal distribution? r-squared is: 0.633
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 2.9

Sulfate 95% UCL Calculation

DATA	ID
0.83	J1PW83/J1PW93
0.85	J1PW81
81.7	J1PW82
9.7	J1RJ77
34.3	J1PW85
51.5	J1PW86
9.9	J1PW87
0.85	J1PW88
0.80	J1PW89
0.80	J1PW90
0.85	J1PW91
8.1	J1PW92

Number of samples		Uncensored values	
Uncensored	12	Mean	16.7
Censored		Lognormal mean	23.1
Detection limit or PQL		Std. devn.	26.0
Method detection limit		Median	4.5
TOTAL	12	Min.	0.80
		Max.	81.7

Lognormal distribution? r-squared is: 0.831
Normal distribution? r-squared is: 0.682
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 29.0

TPH - Diesel 95% UCL Calculation

DATA	ID
13500	J1PW83/J1PW93
1800	J1PW81
1900	J1PW82
4100	J1RJ77
5300	J1PW85
2200	J1PW86
1600	J1PW87
770	J1PW88
1100	J1PW89
335	J1PW90
1000	J1PW91
330	J1PW92

Number of samples		Uncensored values	
Uncensored	12	Mean	2828
Censored		Lognormal mean	2907
Detection limit or PQL		Std. devn.	3674
Method detection limit		Median	1700
TOTAL	12	Min.	330
		Max.	13500

Lognormal distribution? r-squared is: 0.967
Normal distribution? r-squared is: 0.639
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 7899

TPH - Diesel EXT 95% UCL Calculation

DATA	ID
17950	J1PW83/J1PW93
6300	J1PW81
4600	J1PW82
5400	J1RJ77
16000	J1PW85
2900	J1PW86
2200	J1PW87
500	J1PW88
1200	J1PW89
495	J1PW90
1100	J1PW91
2300	J1PW92

Number of samples		Uncensored values	
Uncensored	12	Mean	5079
Censored		Lognormal mean	5625
Detection limit or PQL		Std. devn.	5880
Method detection limit		Median	2600
TOTAL	12	Min.	495
		Max.	17950

Lognormal distribution? r-squared is: 0.969
Normal distribution? r-squared is: 0.748
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 18110

Qualifiers are defined on page 3.

CALCULATION SHEET

Washington Closure Hanford

Originator N. K. Schiffern (initials) | Date 07/01/13 | Calc. No. 0100D-CA-V0508 | Rev. No. 0
Project 100-D Field Remediation | Job No. 14655 | Checked J. D. Skoglie | Date 07/01/13
Subject 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Cleanup Verification 95% UCL Calculations | Sheet No. 19 of 24

Ecology Software (MTCAStat) Results, 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Staging Pile Area (SPA)

Arsenic 95% UCL Calculation

DATA	ID
2.4	J1R645/J1R653
2.5	J1R641
2.7	J1R642
2.4	J1R643
1.6	J1R644
2.3	J1R646
2.0	J1R647
2.2	J1RKM8
2.4	J1RKM9
2.7	J1RKM6
2.6	J1RKM7
2.2	J1RKM5

Number of samples		Uncensored values	
Uncensored	12	Mean	2.3
Censored		Lognormal mean	2.3
Detection limit or PQL		Std. devn.	0.31
Method detection limit		Median	2.4
TOTAL	12	Min.	1.6
		Max.	2.7

Lognormal distribution? r-squared is: 0.861
Normal distribution? r-squared is: 0.912
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 2.5

Barium 95% UCL Calculation

DATA	ID
48.1	J1R645/J1R653
52.0	J1R641
63.0	J1R642
53.0	J1R643
43.5	J1R644
58.1	J1R646
44.4	J1R647
59.6	J1RKM8
53.8	J1RKM9
53.5	J1RKM6
60.2	J1RKM7
58.7	J1RKM5

Number of samples		Uncensored values	
Uncensored	12	Mean	54.0
Censored		Lognormal mean	54.0
Detection limit or PQL		Std. devn.	6.3
Method detection limit		Median	53.7
TOTAL	12	Min.	43.5
		Max.	63.0

Lognormal distribution? r-squared is: 0.940
Normal distribution? r-squared is: 0.954
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 57.6

Beryllium 95% UCL Calculation

DATA	ID
0.21	J1R645/J1R653
0.23	J1R641
0.23	J1R642
0.24	J1R643
0.16	J1R644
0.22	J1R646
0.20	J1R647
0.015	J1RKM8
0.030	J1RKM9
0.057	J1RKM6
0.068	J1RKM7
0.016	J1RKM5

Number of samples		Uncensored values	
Uncensored	12	Mean	0.14
Censored		Lognormal mean	0.17
Detection limit or PQL		Std. devn.	0.094
Method detection limit		Median	0.18
TOTAL	12	Min.	0.015
		Max.	0.24

Lognormal distribution? r-squared is: 0.820
Normal distribution? r-squared is: 0.849
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.18

Cadmium 95% UCL Calculation

DATA	ID
0.045	J1R645/J1R653
0.070	J1R641
0.074	J1R642
0.042	J1R643
0.044	J1R644
0.067	J1R646
0.049	J1R647
0.15	J1RKM8
0.16	J1RKM9
0.14	J1RKM6
0.15	J1RKM7
0.15	J1RKM5

Number of samples		Uncensored values	
Uncensored	12	Mean	0.095
Censored		Lognormal mean	0.097
Detection limit or PQL		Std. devn.	0.050
Method detection limit		Median	0.072
TOTAL	12	Min.	0.042
		Max.	0.16

Lognormal distribution? r-squared is: 0.860
Normal distribution? r-squared is: 0.828
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.12

Chromium 95% UCL Calculation

DATA	ID
5.9	J1R645/J1R653
7.9	J1R641
7.8	J1R642
7.8	J1R643
4.6	J1R644
6.9	J1R646
6.5	J1R647
7.8	J1RKM8
7.4	J1RKM9
7.7	J1RKM6
9.4	J1RKM7
7.8	J1RKM5

Number of samples		Uncensored values	
Uncensored	12	Mean	7.3
Censored		Lognormal mean	7.3
Detection limit or PQL		Std. devn.	1.2
Method detection limit		Median	7.8
TOTAL	12	Min.	4.6
		Max.	9.4

Lognormal distribution? r-squared is: 0.826
Normal distribution? r-squared is: 0.871
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 7.9

Cobalt 95% UCL Calculation

DATA	ID
7.4	J1R645/J1R653
7.7	J1R641
7.4	J1R642
7.7	J1R643
7.9	J1R644
7.4	J1R646
7.7	J1R647
7.3	J1RKM8
7.5	J1RKM9
7.6	J1RKM6
6.4	J1RKM7
7.2	J1RKM5

Number of samples		Uncensored values	
Uncensored	12	Mean	7.4
Censored		Lognormal mean	7.4
Detection limit or PQL		Std. devn.	0.38
Method detection limit		Median	7.5
TOTAL	12	Min.	6.4
		Max.	7.9

Lognormal distribution? r-squared is: 0.781
Normal distribution? r-squared is: 0.808
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 7.6

Copper 95% UCL Calculation

DATA	ID
14.3	J1R645/J1R653
16.0	J1R641
16.4	J1R642
16.2	J1R643
13.6	J1R644
15.5	J1R646
13.5	J1R647
13.1	J1RKM8
14.6	J1RKM9
14.3	J1RKM6
14.2	J1RKM7
13.8	J1RKM5

Number of samples		Uncensored values	
Uncensored	12	Mean	14.6
Censored		Lognormal mean	14.6
Detection limit or PQL		Std. devn.	1.1
Method detection limit		Median	14.3
TOTAL	12	Min.	13.1
		Max.	16.4

Lognormal distribution? r-squared is: 0.938
Normal distribution? r-squared is: 0.930
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 15.2

Hexavalent Chromium 95% UCL Calculation

DATA	ID
0.216	J1R645/J1R653
0.283	J1R641
0.303	J1R642
0.522	J1R643
0.165	J1R644
0.633	J1R646
0.185	J1R647
0.0775	J1RKM8
0.0775	J1RKM9
0.0775	J1RKM6
0.0775	J1RKM7
0.0775	J1RKM5

Number of samples		Uncensored values	
Uncensored	12	Mean	0.225
Censored		Lognormal mean	0.229
Detection limit or PQL		Std. devn.	0.185
Method detection limit		Median	0.175
TOTAL	12	Min.	0.0775
		Max.	0.633

Lognormal distribution? r-squared is: 0.884
Normal distribution? r-squared is: 0.808
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.313

Lead 95% UCL Calculation

DATA	ID
4.5	J1R645/J1R653
3.6	J1R641
5.6	J1R642
4.4	J1R643
2.0	J1R644
7.1	J1R646
2.6	J1R647
4.0	J1RKM8
4.3	J1RKM9
3.9	J1RKM6
3.5	J1RKM7
3.4	J1RKM5

Number of samples		Uncensored values	
Uncensored	12	Mean	4.1
Censored		Lognormal mean	4.1
Detection limit or PQL		Std. devn.	1.3
Method detection limit		Median	4.0
TOTAL	12	Min.	2.0
		Max.	7.1

Lognormal distribution? r-squared is: 0.947
Normal distribution? r-squared is: 0.918
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 5.0

Qualifiers are defined on page 3.

CALCULATION SHEET

Washington Closure Hanford					
Originator	N. K. Schiffern	**Date**	07/01/13	**Calc. No.**	0100D-CA-V0508
Project	100-D Field Remediation	**Job No.**	14655	**Checked**	J. D. Skoglie
Subject	100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Cleanup Verification 95% UCL Calculations	**Rev. No.**	0	**Date**	07/01/13
		Sheet No.	20 of 24		

Ecology Software (MTCAStat) Results, 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Staging Pile Area (SPA)

Manganese 95% UCL Calculation

DATA	ID
257	J1R645/J1R653
295	J1R641
280	J1R642
284	J1R643
264	J1R644
273	J1R646
249	J1R647
308	J1RKM8
291	J1RKM9
292	J1RKM6
265	J1RKM7
273	J1RKM5

Number of samples		Uncensored values	
Uncensored	12	Mean	278
Censored		Lognormal mean	278
Detection limit or PQL		Std. devn.	17.3
Method detection limit		Median	277
TOTAL	12	Min.	249
		Max.	308

Lognormal distribution? r-squared is: 0.987
Normal distribution? r-squared is: 0.987
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 287

Mercury 95% UCL Calculation

DATA	ID
0.0092	J1R645/J1R653
0.011	J1R641
0.043	J1R642
0.036	J1R643
0.0028	J1R644
0.022	J1R646
0.0028	J1R647
0.0027	J1RKM8
0.011	J1RKM9
0.0085	J1RKM6
0.0070	J1RKM7
0.0024	J1RKM5

Number of samples		Uncensored values	
Uncensored	12	Mean	0.013
Censored		Lognormal mean	0.014
Detection limit or PQL		Std. devn.	0.014
Method detection limit		Median	0.0089
TOTAL	12	Min.	0.0024
		Max.	0.043

Lognormal distribution? r-squared is: 0.928
Normal distribution? r-squared is: 0.778
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.034

Molybdenum 95% UCL Calculation

DATA	ID
0.12	J1R645/J1R653
0.24	J1R641
0.35	J1R642
0.46	J1R643
0.14	J1R644
0.32	J1R646
0.13	J1R647
0.12	J1RKM8
0.12	J1RKM9
0.33	J1RKM6
0.13	J1RKM7
0.33	J1RKM5

Number of samples		Uncensored values	
Uncensored	12	Mean	0.23
Censored		Lognormal mean	0.23
Detection limit or PQL		Std. devn.	0.12
Method detection limit		Median	0.19
TOTAL	12	Min.	0.12
		Max.	0.46

Lognormal distribution? r-squared is: 0.827
Normal distribution? r-squared is: 0.837
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.29

Nickel 95% UCL Calculation

DATA	ID
8.4	J1R645/J1R653
9.5	J1R641
8.8	J1R642
8.2	J1R643
7.1	J1R644
8.2	J1R646
10.1	J1R647
9.6	J1RKM8
10.0	J1RKM9
9.9	J1RKM6
12.9	J1RKM7
10.9	J1RKM5

Number of samples		Uncensored values	
Uncensored	12	Mean	9.5
Censored		Lognormal mean	9.5
Detection limit or PQL		Std. devn.	1.5
Method detection limit		Median	9.6
TOTAL	12	Min.	7.1
		Max.	12.9

Lognormal distribution? r-squared is: 0.958
Normal distribution? r-squared is: 0.932
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 10.3

Vanadium 95% UCL Calculation

DATA	ID
51.1	J1R645/J1R653
51.1	J1R641
53.9	J1R642
55.2	J1R643
58.0	J1R644
53.6	J1R646
51.5	J1R647
45.5	J1RKM8
45.4	J1RKM9
46.2	J1RKM6
40.0	J1RKM7
46.8	J1RKM5

Number of samples		Uncensored values	
Uncensored	12	Mean	49.9
Censored		Lognormal mean	49.9
Detection limit or PQL		Std. devn.	5.1
Method detection limit		Median	51.1
TOTAL	12	Min.	40.0
		Max.	58.0

Lognormal distribution? r-squared is: 0.949
Normal distribution? r-squared is: 0.962
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 52.8

Zinc 95% UCL Calculation

DATA	ID
38.2	J1R645/J1R653
44.5	J1R641
45.3	J1R642
51.3	J1R643
39.4	J1R644
43.2	J1R646
36.9	J1R647
38.2	J1RKM8
39.6	J1RKM9
36.2	J1RKM6
33.5	J1RKM7
37.3	J1RKM5

Number of samples		Uncensored values	
Uncensored	12	Mean	40.3
Censored		Lognormal mean	40.3
Detection limit or PQL		Std. devn.	4.9
Method detection limit		Median	38.8
TOTAL	12	Min.	33.5
		Max.	51.3

Lognormal distribution? r-squared is: 0.940
Normal distribution? r-squared is: 0.914
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 43.0

Chloride 95% UCL Calculation

DATA	ID
6.2	J1R645/J1R653
3.1	J1R641
3.9	J1R642
7.3	J1R643
2.9	J1R644
19.1	J1R646
9.2	J1R647
4.2	J1RKM8
4.1	J1RKM9
14.1	J1RKM6
4.3	J1RKM7
4.2	J1RKM5

Number of samples		Uncensored values	
Uncensored	12	Mean	6.9
Censored		Lognormal mean	6.8
Detection limit or PQL		Std. devn.	5.0
Method detection limit		Median	4.3
TOTAL	12	Min.	2.9
		Max.	19.1

Lognormal distribution? r-squared is: 0.893
Normal distribution? r-squared is: 0.755
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 9.3

Nitrogen in Nitrate 95% UCL Calculation

DATA	ID
1.3	J1R645/J1R653
0.99	J1R641
1.7	J1R642
3.2	J1R643
0.90	J1R644
1.9	J1R646
0.94	J1R647
0.96	J1RKM8
0.80	J1RKM9
1.5	J1RKM6
0.82	J1RKM7
0.99	J1RKM5

Number of samples		Uncensored values	
Uncensored	12	Mean	1.3
Censored		Lognormal mean	1.3
Detection limit or PQL		Std. devn.	0.69
Method detection limit		Median	0.99
TOTAL	12	Min.	0.80
		Max.	3.2

Lognormal distribution? r-squared is: 0.861
Normal distribution? r-squared is: 0.731
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 1.7

Nitrogen in Nitrite and Nitrate 95% UCL Calculation

DATA	ID
0.98	J1R645/J1R653
0.52	J1R641
1.4	J1R642
3.1	J1R643
0.48	J1R644
1.8	J1R646
0.48	J1R647
0.56	J1RKM8
0.32	J1RKM9
0.30	J1RKM6
0.53	J1RKM7
0.64	J1RKM5

Number of samples		Uncensored values	
Uncensored	12	Mean	0.93
Censored		Lognormal mean	0.91
Detection limit or PQL		Std. devn.	0.82
Method detection limit		Median	0.55
TOTAL	12	Min.	0.30
		Max.	3.1

Lognormal distribution? r-squared is: 0.907
Normal distribution? r-squared is: 0.721
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 1.5

Qualifiers are defined on page 3.

CALCULATION SHEET

Washington Closure Hanford

Originator	N. K. Schiffern NKS	Date	07/01/13	Calc. No.	0100D-CA-V0508
Project	100-D Field Remediation	Job No.	14655	Checked	J. D. Skoglie JDS
Subject	100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Cleanup Verification 95% UCL Calculations			Rev. No.	0
				Date	07/01/13
				Sheet No.	21 of 24

Ecology Software (MTCAStat) Results, 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Staging Pile Area (SPA)

Sulfate 95% UCL Calculation

DATA	ID				
11.7	J1R645/J1R653				
6.6	J1R641				
9.9	J1R642	Number of samples		Uncensored values	
36.0	J1R643	Uncensored	12	Mean	8.7
5.3	J1R644	Censored		Lognormal mean	8.4
10.6	J1R646	Detection limit or PQL		Std. devn.	9.1
4.5	J1R647	Method detection limit		Median	5.3
4.2	J1RKM8	TOTAL	12	Min.	3.2
3.3	J1RKM9			Max.	36.0
5.2	J1RKM6				
4.3	J1RKM7				
3.2	J1RKM5				

Lognormal distribution? r-squared is: 0.859
Normal distribution? r-squared is: 0.576
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 13.0

TPH - Diesel 95% UCL Calculation

DATA	ID				
4200	J1R645/J1R653				
4500	J1R641				
6800	J1R642	Number of samples		Uncensored values	
7400	J1R643	Uncensored	12	Mean	4700
2200	J1R644	Censored		Lognormal mean	4741
6100	J1R646	Detection limit or PQL		Std. devn.	1650
3200	J1R647	Method detection limit		Median	4350
5400	J1RKM8	TOTAL	12	Min.	2200
4200	J1RKM9			Max.	7400
6100	J1RKM6				
3100	J1RKM7				
3200	J1RKM5				

Lognormal distribution? r-squared is: 0.959
Normal distribution? r-squared is: 0.963
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 5933

TPH - Diesel EXT 95% UCL Calculation

DATA	ID				
6250	J1R645/J1R653				
7000	J1R641				
16000	J1R642	Number of samples		Uncensored values	
17000	J1R643	Uncensored	12	Mean	9063
2700	J1R644	Censored		Lognormal mean	9305
11000	J1R646	Detection limit or PQL		Std. devn.	4642
4900	J1R647	Method detection limit		Median	8150
11000	J1RKM8	TOTAL	12	Min.	2700
9300	J1RKM9			Max.	17000
13000	J1RKM6				
6800	J1RKM7				
3800	J1RKM5				

Lognormal distribution? r-squared is: 0.971
Normal distribution? r-squared is: 0.963
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 13669

Aroclor-1260 95% UCL Calculation

DATA	ID				
1.3	J1R645/J1R653				
2.6	J1R641				
20	J1R642	Number of samples		Uncensored values	
14	J1R643	Uncensored	12	Mean	5.4
1.3	J1R644	Censored		Lognormal mean	5.4
3.9	J1R646	Detection limit or PQL		Std. devn.	6.6
1.3	J1R647	Method detection limit		Median	2.0
1.3	J1RKM8	TOTAL	12	Min.	1.2
3.1	J1RKM9			Max.	20
1.2	J1RKM6				
14	J1RKM7				
1.3	J1RKM5				

Lognormal distribution? r-squared is: 0.805
Normal distribution? r-squared is: 0.690
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 8.6

Qualifiers are defined on page 3.

CALCULATION SHEET

Washington Closure Hanford
Originator N. K. Schiffern — Date 07/01/13 — Calc. No. 0100D-CA-V0508 — Rev. No. 0
Project 100-D Field Remediation — Job No. 14655 — Checked J. D. Skoglie — Date 07/01/13
Subject 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Cleanup Verification 95% UCL Calculations — Sheet No. 22 of 24

Duplicate/Split Analysis - 100-D-77, 100-D-62, 100-D-83:1 Excavation (EXC)

Sampling Area	Sample Number	Sample Date	Aluminum			Arsenic			Barium			Beryllium			Calcium			Chromium			Cobalt			Copper			Iron			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-3	J1PW83	9/18/2012	7070	X	1.5	3.6		0.64	61.3		0.074	0.27		0.032	9060	X	13.8	13.0	X	0.057	6.1	X	0.098	14.1		0.21	17600	X	3.7	3.9	X	0.26
Duplicate of J1PW83	J1PW93	9/18/2012	7140	X	1.4	3.5		0.61	63.3		0.071	0.26		0.031	8710	X	13.1	13.4	X	0.054	6.1	X	0.093	14.0		0.20	17700	X	3.5	4.0	X	0.25
Split of J1PW83	J1PWF8	9/18/2012	6010		4.41	3.03		0.882	54.0		0.441	0.215		0.176	7790		88.2	10.8		0.176	4.91		1.76	11.9		0.882	14500		17.6	3.31		0.441

Analysis:

		Aluminum	Arsenic	Barium	Beryllium	Calcium	Chromium	Cobalt	Copper	Iron	Lead
TDL		5	10	2	0.2	100	1	2	1	5	5
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)
	RPD	1.0%		3.2%		3.9%	3.0%		0.7%	0.6%	
	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable
Split Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)
	RPD	16.2%		12.7%		15.1%	18.5%		16.9%	19.3%	
	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable

Duplicate/Split Analysis - 100-D-77, 100-D-62, 100-D-83:1 Excavation (EXC)

Sampling Area	HEIS Number	Sample Date	Magnesium			Manganese			Mercury			Molybdenum			Nickel			Potassium			Silicon			Sodium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-3	J1PW83	9/18/2012	4920	X	3.6	289	X	0.098	0.0074	B	0.0051	0.25	B	0.25	12.5	X	0.12	1050		40.0	376	XJ	5.5	280		57.6	40.4		0.092	35.0	X	0.39
Duplicate of J1PW83	J1PW93	9/18/2012	4860	X	3.4	286	X	0.093	0.0068	B	0.0052	0.24	U	0.24	12.7	X	0.11	1090		38.2	424	XJ	5.3	269		55.0	41.6		0.088	34.8	X	0.37
Split of J1PW83	J1PWF8	9/18/2012	4000		66.2	242		4.41	0.0266	U	0.0266	0.357	B	1.76	9.49		3.53	944		353	256		1.76	232		44.1	36.7		2.21	30.8		8.82

Analysis:

		Magnesium	Manganese	Mercury	Molybdenum	Nickel	Potassium	Silicon	Sodium	Vanadium	Zinc
TDL		75	5	0.2	0.2	4	400	2	50	2.5	1
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)		No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)
	RPD	1.2%	1.0%					12.0%	4.0%	2.9%	0.6%
	Difference > 2 TDL?	Not applicable	Not applicable	No - acceptable	Not applicable	No - acceptable	No - acceptable	Not applicable	Not applicable	Not applicable	Not applicable
Split Analysis	Both > PQL?	Yes (continue)	Yes (continue)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	Yes (calc RPD)			No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)
	RPD	20.6%	17.7%					38.0%		9.6%	12.8%
	Difference > 2 TDL?	Not applicable	Not applicable	Not applicable	No - acceptable	No - acceptable	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable

Duplicate/Split Analysis - 100-D-77, 100-D-62, 100-D-83:1 Excavation (EXC)

Sampling Area	HEIS Number	Sample Date	Nitrogen in Nitrate			Nitrogen in Nitrite and Nitrate			TPH - Diesel			TPH - Diesel EXT			Acenaphthene (Method 8310)			Acenaphthylene (Method 8310)			Anthracene (Method 8310)			Benzo(a)anthracene (Method 8310)			Benzo(a)pyrene (Method 8310)			Benzo(b)fluoranthene (Method 8310)		
			mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
EXC-3	J1PW83	9/18/2012	0.67	BJ	0.31	1.2	N	0.30	24000		630	32000		920	190	NX	10	13	JX	9.0	390	N	3.0	660	N	3.2	440	N	6.4	500	N	4.2
Duplicate of J1PW83	J1PW93	9/18/2012	0.57	BJ	0.29	1.3		0.30	3000	J	660	3900		960	100		9.2	8.3	U	8.3	2.8	U	2.8	160		2.9	80		5.9	120		3.9
Split of J1PW83	J1PWF8	9/18/2012				0.46	B	0.10	9800		3310				1530	D	13	257	D	13	348	D	13	503	D	13	493	D	13	257	D	13

Analysis:

		Nitrogen in Nitrate	Nitrogen in Nitrite and Nitrate	TPH - Diesel	TPH - Diesel EXT	Acenaphthene (Method 8310)	Acenaphthylene (Method 8310)	Anthracene (Method 8310)	Benzo(a)anthracene (Method 8310)	Benzo(a)pyrene (Method 8310)	Benzo(b)fluoranthene (Method 8310)
TDL		0.75	0.75	5000	5000	15	15	15	15	15	15
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)			Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)
	RPD					62.1%			122.0%	138.5%	122.6%
	Difference > 2 TDL?	No - acceptable	No - acceptable	Yes - assess further	Yes - assess further	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
Split Analysis	Both > PQL?		Yes (continue)	Yes (continue)		Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?		No-Stop (acceptable)	No-Stop (acceptable)		Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)
	RPD					155.8%		11.4%	27.0%	11.4%	64.2%
	Difference > 2 TDL?		No - acceptable	Yes - assess further		Not applicable	Yes - assess further	Not applicable	Not applicable	Not applicable	Not applicable

Qualifiers are defined on page 3.

CALCULATION SHEET

Washington Closure Hanford

Originator N. K. Schiffern NS **Date** 07/01/13 **Calc. No.** 0100D-CA-V0508 **Rev. No.** 0
Project 100-D Field Remediation **Job No.** 14655 **Checked** J. D. Skoglie JDS **Date** 07/01/13
Subject 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Cleanup Verification 95% UCL Calculations **Sheet No.** 23 of 24

Duplicate/Split Analysis - 100-D-77, 100-D-62, 100-D-83:1 Excavation (EXC)

Sampling Area	HEIS Number	Sample Date	Benzo(ghi)perylene (Method 8310)			Benzo(k)fluoranthene (Method 8310)			Chrysene (Method 8310)			Dibenz(a,h)anthracene (Method 8310)			Fluoranthene (Method 8310)		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
EXC-3	J1PW83	9/18/2012	320	N	7.2	180	N	3.9	560	N	4.8	92	X	11	1200	N	13
Duplicate of J1PW83	J1PW93	9/18/2012	65		6.6	41		3.6	130		4.4	15	JX	10	240		12
Split of J1PW83	J1PWF8	9/18/2012	508	D	13	155	D	13	631	D	13	37.1	D	13	1260	D	13

Sampling Area	HEIS Number	Sample Date	Fluorene (Method 8310)			Indeno(1,2,3-cd)pyrene (Method 8310)			Phenanthrene (Method 8310)			Pyrene (Method 8310)			Acenaphthene (Method 8270)		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
EXC-3	J1PW83	9/18/2012	250		5.3	300	N	12	1200	N	12	1300	N	12	390		9.9
Duplicate of J1PW83	J1PW93	9/18/2012	71		4.8	43	X	11	260		11	210		11	35	J	10
Split of J1PW83	J1PWF8	9/18/2012	201	D	13	199	D	13	1200	D	13	909	D	13	648	UD	648

Analysis:

		Benzo(ghi)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Phenanthrene	Pyrene	Acenaphthene
TDL		15	15	15	15	15	15	15	15	15	660
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**	No-Stop (acceptable)	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**	No-Stop (acceptable)
	RPD			*124.6%*		*133.3%*			*128.8%*	*144.4%*	
	Difference > 2 TDL?	Yes - assess further	Yes - assess further	Not applicable	Yes - assess further	Not applicable	Yes - assess further	Yes - assess further	Not applicable	Not applicable	No - acceptable
Split Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	No-Stop (acceptable)
	Both >5xTDL?	**Yes (calc RPD)**	**Yes (calc RPD)**	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**	**Yes (calc RPD)**	**Yes (calc RPD)**	**Yes (calc RPD)**	
	RPD	*45.4%*	14.9%	11.9%		4.9%	21.7%	*40.5%*	0.0%	*35.4%*	
	Difference > 2 TDL?	Not applicable	Not applicable	Not applicable	Yes - assess further	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable

Duplicate/Split Analysis - 100-D-77, 100-D-62, 100-D-83:1 Excavation (EXC)

Sampling Area	HEIS Number	Sample Date	Anthracene (Method 8270)			Benzo(a)anthracene (Method 8270)			Benzo(a)pyrene (Method 8270)			Benzo(b)fluoranthene (Method 8270)			Benzo(ghi)perylene (Method 8270)		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
EXC-3	J1PW83	9/18/2012	1000		16	1800		19	1100		19	2100		25	620		15
Duplicate of J1PW83	J1PW93	9/18/2012	73	J	17	150	J	20	110	J	20	200	J	26	62	J	16
Split of J1PW83	J1PWF8	9/18/2012	107	J D	648	312	D J	648	182	J D	648	241	J D	648	148	J D	648

Sampling Area	HEIS Number	Sample Date	Chrysene (Method 8270)			Dibenz(a,h)anthracene (Method 8270)			Fluoranthene (Method 8270)			Fluorene (Method 8270)			Indeno(1,2,3-cd)pyrene (Method 8270)		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
EXC-3	J1PW83	9/18/2012	1800		26	160	J	18	3700		34	580		17	550		21
Duplicate of J1PW83	J1PW93	9/18/2012	170	J	27	19	J	19	340		36	64	J	18	47	J	22
Split of J1PW83	J1PWF8	9/18/2012	402	J D	648	648	UD	648	737	D	648	142	J D	648	120	J D	648

Analysis:

		Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene
TDL		660	660	660	660	660	660	660	660	660	660
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	No-Stop (acceptable)	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)		No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)
	RPD										
	Difference > 2 TDL?	No - acceptable	Yes - assess further	No - acceptable	Yes - assess further	No - acceptable	Yes - assess further	No - acceptable	Yes - assess further	No - acceptable	No - acceptable
Split Analysis	Both > PQL?	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	**Yes (continue)**	No-Stop (acceptable)	No-Stop (acceptable)
	Both >5xTDL?								No-Stop (acceptable)		
	RPD										
	Difference > 2 TDL?	No - acceptable	Yes - assess further	No - acceptable	Yes - assess further	No - acceptable	Yes - assess further	Not applicable	Yes - assess further	No - acceptable	No - acceptable

Duplicate/Split Analysis - 100-D-77, 100-D-62, 100-D-83:1 Excavation (EXC)

Sampling Area	HEIS Number	Sample Date	Phenanthrene (Method 8270)			Pyrene (Method 8270)			2-Methylnaphthalene			Carbazole			Dibenzofuran		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
EXC-3	J1PW83	9/18/2012	3900		16	2900		12	120	J	18	570		34	340		19
Duplicate of J1PW83	J1PW93	9/18/2012	360		17	270	J	12	20	J	19	42	J	36	53	J	20
Split of J1PW83	J1PWF8	9/18/2012	784	D	648	664	D	648	648	UD	648	648	UD	648	121	J D	648

Analysis:

		Phenanthrene	Pyrene	2-Methylnaphthalene	Carbazole	Dibenzofuran
TDL		660	660	660	660	660
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)
	RPD					
	Difference > 2 TDL?	Yes - assess further	Yes - assess further	No - acceptable	No - acceptable	No - acceptable
Split Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)			
	RPD					
	Difference > 2 TDL?	Yes - assess further	Yes - assess further	Not applicable	Not applicable	No - acceptable

Qualifiers are defined on page 3.

CALCULATION SHEET

Washington Closure Hanford

Originator	N. K. Schiffern	**Date**	07/01/13	**Calc. No.**	0100D-CA-V0508
Project	100-D Field Remediation	**Job No.**	14655	**Checked**	J. D. Skoglie
Subject	100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Cleanup Verification 95% UCL Calculations	**Rev. No.**	0	**Date**	07/01/13
				Sheet No.	24 of 24

Duplicate/Split Analysis - 100-D-77, 100-D-62, 100-D-83:1 Staging Pile Area (SPA)

Sampling Area	Sample Number	Sample Date	Aluminum			Arsenic			Barium			Beryllium			Cadmium			Calcium			Chromium			Cobalt			Copper		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SPA-5	J1R645	4/8/2013	5150	X	1.4	2.4		0.60	52.2	X	0.070	0.21		0.030	0.047	B	0.037	6290	X	12.9	5.8	X	0.053	7.6	X	0.091	14.6	X	0.20
Duplicate of J1R645	J1R653	4/8/2013	4690	X	1.4	2.3		0.60	43.9	X	0.069	0.21		0.030	0.043	B	0.037	5750	X	12.8	6.0	X	0.053	7.1	X	0.091	14.0	X	0.20
Split of J1R645	J1R670	4/8/2013	4880		29.7	2.6		0.67	51.4	N	0.53	0.36	B	0.36	0.21	U	0.21	6290		28.2	6.3		0.65	8.2	B	2.0	13.2		1.5

Analysis:

		Aluminum	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper
TDL		5	10	2	0.2	0.2	100	1	2	1
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**	No-Stop (acceptable)	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**
	RPD	9.3%		17.3%			9.0%	3.4%		4.2%
	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	No - acceptable	No - acceptable	Not applicable	Not applicable	No - acceptable	Not applicable
Split Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	No-Stop (acceptable)	No-Stop (acceptable)	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**			**Yes (calc RPD)**	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**
	RPD	5.4%		1.5%			0.0%	8.3%		10.1%
	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable	Not applicable	No - acceptable	Not applicable

Duplicate/Split Analysis - 100-D-77, 100-D-62, 100-D-83:1 Staging Pile Area (SPA)

Sampling Area	HEIS Number	Sample Date	Hexavalent Chromium			Iron			Lead			Magnesium			Manganese			Mercury			Nickel			Potassium			Silicon		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SPA-5	J1R645	4/8/2013	0.205		0.155	20500	X	3.5	3.5		0.25	4030	X	3.4	260	X	0.091	0.0096	B	0.0058	9.5	X	0.11	786		37.5	104	N	5.2
Duplicate of J1R645	J1R653	4/8/2013	0.226		0.155	20100	X	3.4	5.4		0.24	3790	X	3.4	254	X	0.091	0.0088	B	0.0060	7.3	X	0.11	735		37.2	137	N	5.1
Split of J1R645	J1R670	4/8/2013	0.16	B	0.10	18400		6.3	4.5		0.36	3830		17.6	263	N	0.33	0.015	B	0.011	8.8		0.48	837	BN	715	1100		8.2

Analysis:

		Hexavalent Chromium	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Silicon
TDL		0.5	5	5	75	5	0.2	4	400	2
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	No-Stop (acceptable)	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	**Yes (calc RPD)**
	RPD		2.0%		6.1%	2.3%				27.4%
	Difference > 2 TDL?	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable	No - acceptable	Not applicable
Split Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	No-Stop (acceptable)	**Yes (calc RPD)**	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	**Yes (calc RPD)**
	RPD		10.8%		5.1%	1.1%				*165.4%*
	Difference > 2 TDL?	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable	No - acceptable	Not applicable

Duplicate/Split Analysis - 100-D-77, 100-D-62, 100-D-83:1 Staging Pile Area (SPA)

Sampling Area	HEIS Number	Sample Date	Sodium			Vanadium			Zinc			Chloride			Nitrogen in Nitrate			Nitrogen in Nitrite and Nitrate			Sulfate			TPH - Diesel			TPH - Diesel EXT		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
SPA-5	J1R645	4/8/2013	275		54.0	52.6	X	0.086	38.5	X	0.36	5.9		2.0	1.2	B	0.32	0.85	C	0.31	11.4		1.8	3900	JB	700	5700	B	1000
Duplicate of J1R645	J1R653	4/8/2013	219		53.5	49.5	X	0.085	37.8	X	0.36	6.5		2.0	1.3	B	0.32	1.1	C	0.31	11.9		1.8	4500	B	670	6800	B	980
Split of J1R645	J1R670	4/8/2013	279	N	99.9	44.8	N	2.7	37.4	N	4.2	5.0		0.21	0.60		0.042	0.62	NC	0.047	11.5		0.52	350	U	350			

Analysis:

		Sodium	Vanadium	Zinc	Chloride	Nitrogen in Nitrate	Nitrogen in Nitrite and Nitrate	Sulfate	TPH - Diesel	TPH - Diesel EXT
TDL		50	2.5	1	2	0.75	0.75	5	5000	5000
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	No-Stop (acceptable)	**Yes (calc RPD)**	**Yes (calc RPD)**	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)
	RPD		6.1%	1.8%						
	Difference > 2 TDL?	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable
Split Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	No-Stop (acceptable)	
	Both >5xTDL?	**Yes (calc RPD)**	**Yes (calc RPD)**	**Yes (calc RPD)**	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)		
	RPD	1.4%	16.0%	2.9%						
	Difference > 2 TDL?	Not applicable	Not applicable	Not applicable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	Not applicable	

Qualifiers are defined on page 3.

Attachment 1. 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Verification Sample Results (Metals).

Sample Area	HEIS Number	Sample Date	Aluminum			Antimony			Arsenic			Barium			Beryllium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-3	J1PW83	9/18/2012	7070	X	1.5	0.40	BJ	0.37	3.6		0.64	61.3		0.074	0.27		0.032
Duplicate of J1PW83	J1PW93	9/18/2012	7140	X	1.4	0.35	UJ	0.35	3.5		0.61	63.3		0.071	0.26		0.031
EXC-1	J1PW81	9/18/2012	8090	X	1.4	0.36	UJ	0.36	3.6		0.62	65.4		0.071	0.34		0.031
EXC-2	J1PW82	9/18/2012	6360	X	1.4	0.34	UJ	0.34	2.2		0.58	73.0		0.067	0.27		0.029
EXC-4	J1RJ77	3/15/2013	4040	X	1.5	0.36	U	0.36	1.2		0.62	46.8	X	0.072	0.53	B	0.16
EXC-5	J1PW85	9/18/2012	6150	X	1.3	0.33	UJ	0.33	3.1		0.57	68.3		0.065	0.34	B	0.14
EXC-6	J1PW86	9/18/2012	6250	X	1.4	0.34	UJ	0.34	2.6		0.59	73.7		0.068	0.33	B	0.15
EXC-7	J1PW87	9/18/2012	5610	X	1.3	0.32	UJ	0.32	2.3		0.55	60.4		0.064	0.32	B	0.14
EXC-8	J1PW88	9/18/2012	5000	X	1.4	0.34	UJ	0.34	1.9		0.59	42.1		0.068	0.33	B	0.15
EXC-9	J1PW89	9/18/2012	5960	X	1.4	0.36	UJ	0.36	2.3		0.62	55.2		0.071	0.35	B	0.15
EXC-10	J1PW90	9/18/2012	6410	X	1.5	0.36	UJ	0.36	2.5		0.63	56.7		0.072	0.37	B	0.16
EXC-11	J1PW91	9/18/2012	4880	X	1.5	0.38	UJ	0.38	1.9		0.66	53.3		0.076	0.32	B	0.16
EXC-12	J1PW92	9/18/2012	6320	X	1.3	0.33	UJ	0.33	2.2		0.57	62.8		0.065	0.26		0.028
Split of J1PW83	J1PWF8	9/18/2012	6010		4.41	0.529	U	0.529	3.03		0.882	54.0		0.441	0.215		0.176
SPA-5	J1R645	4/8/2013	5150	X	1.4	0.35	U	0.35	2.4		0.60	52.2	X	0.070	0.21		0.030
Duplicate of J1R645	J1R653	4/8/2013	4690	X	1.4	0.34	U	0.34	2.3		0.60	43.9	X	0.069	0.21		0.030
SPA-1	J1R641	4/8/2013	5780	X	1.4	0.34	U	0.34	2.5		0.58	52.0	X	0.067	0.23		0.029
SPA-2	J1R642	4/8/2013	5790	X	1.4	0.35	U	0.35	2.7		0.61	63.0	X	0.070	0.23		0.031
SPA-3	J1R643	4/8/2013	5520	X	1.4	0.34	U	0.34	2.4		0.60	53.0	X	0.069	0.24		0.030
SPA-4	J1R644	4/8/2013	4230	X	1.6	0.39	U	0.39	1.6		0.68	43.5	X	0.078	0.16	B	0.034
SPA-6	J1R646	4/8/2013	5390	X	1.6	0.39	U	0.39	2.3		0.68	58.1	X	0.078	0.22		0.034
SPA-7	J1R647	4/8/2013	4450	X	1.5	0.36	U	0.36	2.0		0.63	44.4	X	0.073	0.20		0.032
SPA-8	J1RKM8	4/29/2013	6270		1.4	0.51	B	0.34	2.2		0.60	59.6		0.069	0.030	U	0.030
SPA-9	J1RKM9	4/29/2013	5870		1.4	0.54		0.34	2.4		0.60	53.8		0.069	0.030	B	0.030
SPA-10	J1RKM6	4/29/2013	5960		1.5	0.57	B	0.37	2.7		0.65	53.5		0.075	0.057	B	0.033
SPA-11	J1RKM7	4/29/2013	6190		1.5	0.53	B	0.36	2.6		0.63	60.2		0.073	0.068	B	0.032
SPA-12	J1RKM5	4/29/2013	6020		1.5	0.87		0.36	2.2		0.63	58.7		0.072	0.031	U	0.031
Split of J1R645	J1R670	4/8/2013	4880		29.7	2.3	N	1.4	2.6		0.67	51.4	N	0.53	0.36	B	0.36
FS-1	J1RJ78	3/15/2013	3640	X	1.4	0.34	U	0.34	0.87	B	0.60	62.9	X	0.069	0.51	B	0.15
FS-2	J1PWC9	9/18/2012	5610		1.4	0.35	U	0.35	2.3		0.61	61.7		0.070	0.15	B	0.15
FS-3	J1PWD0	9/18/2012	5380		1.5	0.36	U	0.36	2.1		0.62	55.1		0.071	0.15	U	0.15
FS-4	J1PWD1	9/18/2012	6220		1.5	0.37	U	0.37	2.3		0.65	63.5		0.074	0.17	B	0.16
FS-5	J1PWD2	9/18/2012	4390		1.5	0.37	U	0.37	1.8		0.64	49.8		0.073	0.16	U	0.16
FS-6	J1PWD3	9/18/2012	4520		1.4	0.35	U	0.35	2.3		0.60	56.7		0.069	0.15	U	0.15
FS-5 (100-D-77)	J1R160	9/4/2012	7150	X	1.5	0.71		0.37	2.5		0.63	65.9	X	0.073	0.18	B	0.032
FS D-83:1-1	J1RN38	5/29/2013	3960		1.5	1.1	M	0.36	1.5	M	0.63	47.7		0.073	0.032	U	0.032
FS D-83:1-2	J1RN39	5/29/2013	3790		1.4	0.77		0.35	1.5		0.61	49.2		0.071	0.031	U	0.031
FS D-83:1-3	J1RN40	5/29/2013	5420		1.4	0.59		0.35	2.1		0.60	57.4		0.070	0.030	U	0.030
Equipment Blank	J1R654	4/8/2013	185	X	1.6	0.38	U	0.38	0.66	U	0.66	1.8	X	0.076	0.047	B	0.033

Acronyms and notes apply to all of the tables in this attachment.

[a] Benzo(a)pyrene results from sample location EXC-3 are provided for informational purposes only.

[b] Sample results from HEIS numbers J1PW84, J1R648, J1R650, J1R651, and J1PWC8 are provided for informational purposes only.

Note: Data qualified with B, C, D J, M, N, P and/or X are considered acceptable values.

B = Estimated result. Result is less than the RL, but greater than the MDL.

C = detected in both the sample and the associated QC blank, sample concentration was </= 5X blank concentration.

D = obtained from dilution.

EXC = excavation

FS = focused sample

HEIS = Hanford Environmental Information System

J = estimate

M = sample duplicate precision not met.

N= recovery exceeds upper or lower control limits

P = aroclor flag, greater than 25% difference for detected concentrations between the two GC columns.

PAH = polycyclic aromatic hydrocarbons

PCB = polychlorinated biphenyls

PEST = pesticide

PQL = practical quantitation limit

Q = qualifier

RAG = remedial action goal

R = rejected

RSVP = remaining site verification package

SPA = staging pile area

SVOA = semivolatile organic analysis

TPH = total petroleum hydrocarbons

U = undetected

X (metals) = serial dilution in the analytical batch indicates that physical and chemical interferences are present.

X (organics) = More than 40% difference between columns, lower result reported.

Y = additional qualifiers used as required are explained in the case narrative.

Attachment	1	Sheet No.	1 of 31
Originator	N. K. Schiffern NKS	Date	07/08/13
Checked	J. D. Skoglie JS	Date	07/08/13
Calc. No.	0100D-CA-V0508	Rev. No.	0

Attachment 1. 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Verification Sample Results (Metals).

Sample Area	HEIS Number	Sample Date	Boron			Cadmium			Calcium			Chromium			Cobalt		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-3	J1PW83	9/18/2012	0.96	U	0.96	0.040	U	0.040	9060	X	13.8	13.0	X	0.057	6.1	X	0.098
Duplicate of J1PW83	J1PW93	9/18/2012	0.91	U	0.91	0.038	U	0.038	8710	X	13.1	13.4	X	0.054	6.1	X	0.093
EXC-1	J1PW81	9/18/2012	1.3	B	0.92	0.062	B	0.038	8100	X	13.2	11.1	X	0.054	7.9	X	0.094
EXC-2	J1PW82	9/18/2012	0.92	B	0.87	0.036	U	0.036	8800	X	12.5	8.3	X	0.051	7.8	X	0.088
EXC-4	J1RJ77	3/15/2013	0.93	U	0.93	0.039	U	0.039	5850	X	13.3	4.8		0.055	10.8		0.47
EXC-5	J1PW85	9/18/2012	0.84	U	0.84	0.035	U	0.035	9990	X	12.1	8.2	X	0.050	9.6	X	0.43
EXC-6	J1PW86	9/18/2012	0.87	U	0.87	0.037	U	0.037	6750	X	12.6	8.5	X	0.052	9.5	X	0.45
EXC-7	J1PW87	9/18/2012	0.82	U	0.82	0.034	U	0.034	6200	X	11.9	7.1	X	0.049	9.7	X	0.42
EXC-8	J1PW88	9/18/2012	0.88	U	0.88	0.037	U	0.037	5830	X	12.7	5.3	X	0.052	10.8	X	0.45
EXC-9	J1PW89	9/18/2012	0.92	U	0.92	0.038	U	0.038	6320	X	13.2	6.9	X	0.054	10.3	X	0.47
EXC-10	J1PW90	9/18/2012	0.93	U	0.93	0.039	U	0.039	6210	X	13.4	6.2	X	0.055	10.8	X	0.48
EXC-11	J1PW91	9/18/2012	0.98	U	0.98	0.041	U	0.041	6670	X	14.1	5.9	X	0.058	10.6	X	0.50
EXC-12	J1PW92	9/18/2012	0.84	U	0.84	0.035	U	0.035	10200	X	12.1	6.8	X	0.050	6.9	X	0.086
Split of J1PW83	J1PWF8	9/18/2012	0.967	B	1.76	0.0877	B	0.176	7790		88.2	10.8		0.176	4.91		1.76
SPA-5	J1R645	4/8/2013	0.90	U	0.90	0.047	B	0.037	6290	X	12.9	5.8	X	0.053	7.6	X	0.091
Duplicate of J1R645	J1R653	4/8/2013	0.89	U	0.89	0.043	B	0.037	5750	X	12.8	6.0	X	0.053	7.1	X	0.091
SPA-1	J1R641	4/8/2013	0.92	BN	0.87	0.070	B	0.036	6710	X	12.5	7.9	XM	0.051	7.7	X	0.088
SPA-2	J1R642	4/8/2013	1.2	B	0.91	0.074	B	0.038	8130	X	13.0	7.8	X	0.054	7.4	X	0.093
SPA-3	J1R643	4/8/2013	0.89	U	0.89	0.042	B	0.037	7250	X	12.8	7.8	X	0.053	7.7	X	0.091
SPA-4	J1R644	4/8/2013	1.0	U	1.0	0.044	B	0.042	5150	X	14.5	4.6	X	0.060	7.9	X	0.10
SPA-6	J1R646	4/8/2013	1.0	U	1.0	0.067	B	0.042	5960	X	14.4	6.9	X	0.059	7.4	X	0.10
SPA-7	J1R647	4/8/2013	0.94	U	0.94	0.049	B	0.039	5650	X	13.5	6.5	X	0.056	7.7	X	0.096
SPA-8	J1RKM8	4/29/2013	0.89	U	0.89	0.15	B	0.037	6250	X	12.8	7.8		0.053	7.3	X	0.091
SPA-9	J1RKM9	4/29/2013	0.89	U	0.89	0.16	B	0.037	7180	X	12.8	7.4		0.053	7.5	X	0.091
SPA-10	J1RKM6	4/29/2013	0.97	U	0.97	0.14	B	0.040	8980	X	13.9	7.7		0.057	7.6	X	0.099
SPA-11	J1RKM7	4/29/2013	0.94	U	0.94	0.15	B	0.039	6690	X	13.5	9.4		0.056	6.4	X	0.096
SPA-12	J1RKM5	4/29/2013	0.93	U	0.93	0.15	B	0.039	7280	X	13.4	7.8		0.055	7.2	X	0.095
Split of J1R645	J1R670	4/8/2013	3.2	B	3.2	0.21	U	0.21	6290		28.2	6.3		0.65	8.2	B	2.0
FS-1	J1RJ78	3/15/2013	0.89	U	0.89	0.037	U	0.037	5550	X	12.8	3.7		0.053	10.6		0.45
FS-2	J1PWC9	9/18/2012	0.90	U	0.90	0.18		0.038	8050	X	13.0	7.4		0.053	10.0	X	0.46
FS-3	J1PWD0	9/18/2012	0.92	U	0.92	0.17	B	0.038	6520	X	13.2	6.9		0.054	9.9	X	0.47
FS-4	J1PWD1	9/18/2012	0.96	U	0.96	0.17	B	0.040	5730	X	13.8	6.7		0.057	11.6	X	0.49
FS-5	J1PWD2	9/18/2012	0.94	U	0.94	0.17	B	0.039	5710	X	13.6	5.8		0.056	8.0	X	0.48
FS-6	J1PWD3	9/18/2012	0.90	U	0.90	0.17	B	0.037	8600	X	12.9	4.7		0.053	11.4	X	0.46
FS-5 (100-D-77)	J1R160	9/4/2012	1.7	B	0.94	0.048	B	0.039	22500	X	13.6	7.1	X	0.056	8.1	X	0.096
FS D-83:1-1	J1RN38	5/29/2013	0.94	UN	0.94	0.092	B	0.039	5320	M	13.5	3.3	X	0.055	8.5		0.096
FS D-83:1-2	J1RN39	5/29/2013	0.91	U	0.91	0.13	B	0.038	5130		13.1	3.8	X	0.054	10.5		0.093
FS D-83:1-3	J1RN40	5/29/2013	0.90	U	0.90	0.13	B	0.038	6830		12.9	7.3	X	0.053	8.4		0.092
Equipment Blank	J1R654	4/8/2013	0.98	U	0.98	0.041	U	0.041	40.7	BCX	14.1	0.33	X	0.058	0.10	UX	0.10

Attachment	1	Sheet No.	2 of 31
Originator	N. K. Schiffern	Date	07/08/13
Checked	J. D. Skoglie	Date	07/08/13
Calc. No.	0100D-CA-V0508	Rev. No.	0

Attachment 1. 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Verification Sample Results (Metals).

Sample Area	HEIS Number	Sample Date	Copper			Hexavalent Chromium			Iron			Lead			Lithium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-3	J1PW83	9/18/2012	14.1		0.21	0.155	UJ	0.155	17600	X	3.7	3.9	X	0.26			
Duplicate of J1PW83	J1PW93	9/18/2012	14.0		0.20	0.155	UJ	0.155	17700	X	3.5	4.0	X	0.25			
EXC-1	J1PW81	9/18/2012	17.9		0.20	0.155	UJ	0.155	22900	X	3.6	18.5	X	0.25			
EXC-2	J1PW82	9/18/2012	15.5		0.19	0.155	UJ	0.155	23200	X	3.4	7.4	X	0.24			
EXC-4	J1RJ77	3/15/2013	14.0		1.0	0.155	U	0.155	25200	X	3.6	2.2	B	1.3			
EXC-5	J1PW85	9/18/2012	16.3		0.93	0.155	UJ	0.155	24100	X	3.3	9.1	X	1.2			
EXC-6	J1PW86	9/18/2012	14.5		0.97	0.155	UJ	0.155	23800	X	3.4	4.1	X	1.2			
EXC-7	J1PW87	9/18/2012	15.7		0.91	0.155	UJ	0.155	23900	X	3.2	3.3	X	1.1			
EXC-8	J1PW88	9/18/2012	15.2		0.97	0.155	UJ	0.155	27100	X	3.4	3.3	X	1.2			
EXC-9	J1PW89	9/18/2012	16.2		1.0	0.155	UJ	0.155	24700	X	3.6	4.6	X	1.3			
EXC-10	J1PW90	9/18/2012	16.8		1.0	0.155	UJ	0.155	25300	X	3.6	4.6	X	1.3			
EXC-11	J1PW91	9/18/2012	14.9		1.1	0.155	UJ	0.155	26500	X	3.8	3.8	X	1.3			
EXC-12	J1PW92	9/18/2012	16.2		0.19	0.155	UJ	0.155	21800	X	3.3	3.9	X	0.23			
Split of J1PW83	J1PWF8	9/18/2012	11.9		0.882	0.20	U	0.20	14500		17.6	3.31		0.441			
SPA-5	J1R645	4/8/2013	14.6	X	0.20	0.205		0.155	20500	X	3.5	3.5		0.25			
Duplicate of J1R645	J1R653	4/8/2013	14.0	X	0.20	0.226		0.155	20100	X	3.4	5.4		0.24			
SPA-1	J1R641	4/8/2013	16.0	X	0.19	0.283		0.155	21100	X	3.4	3.6		0.24			
SPA-2	J1R642	4/8/2013	16.4	X	0.20	0.303		0.155	20700	X	3.5	5.6		0.25			
SPA-3	J1R643	4/8/2013	16.2	X	0.20	0.522		0.155	21700	X	3.4	4.4		0.24			
SPA-4	J1R644	4/8/2013	13.6	X	0.22	0.165		0.155	21400	X	3.9	2.0		0.28			
SPA-6	J1R646	4/8/2013	15.5	X	0.22	0.633		0.155	21300	X	3.9	7.1		0.28			
SPA-7	J1R647	4/8/2013	13.5	X	0.21	0.185		0.155	20200	X	3.6	2.6		0.26			
SPA-8	J1RKM8	4/29/2013	13.1		0.20	0.155	U	0.155	20100	X	3.4	4.0		0.24			
SPA-9	J1RKM9	4/29/2013	14.6		0.20	0.155	U	0.155	19800	X	3.4	4.3		0.24			
SPA-10	J1RKM6	4/29/2013	14.3		0.21	0.155	U	0.155	20200	X	3.7	3.9		0.27			
SPA-11	J1RKM7	4/29/2013	14.2		0.21	0.155	U	0.155	17500	X	3.6	3.5		0.26			
SPA-12	J1RKM5	4/29/2013	13.8		0.21	0.155	U	0.155	19800	X	3.6	3.4		0.26			
Split of J1R645	J1R670	4/8/2013	13.2		1.5	0.16	B	0.10	18400		6.3	4.5		0.36	4.2	B	1.4
FS-1	J1RJ78	3/15/2013	13.8		0.98	0.155	U	0.155	24100	X	3.4	2.4		1.2			
FS-2	J1PWC9	9/18/2012	16.4		1.0	0.155	U	0.155	24400	X	3.5	3.9		1.2			
FS-3	J1PWD0	9/18/2012	15.7		1.0	0.155	U	0.155	24500	X	3.6	3.3		1.3			
FS-4	J1PWD1	9/18/2012	17.4		1.1	0.155	U	0.155	27600	X	3.7	3.2		1.3			
FS-5	J1PWD2	9/18/2012	16.5		1.0	0.259		0.155	31200	X	3.7	2.2	B	1.3			
FS-6	J1PWD3	9/18/2012	18.1		0.99	0.155	U	0.155	25800	X	3.5	3.9		1.2			
FS-5 (100-D-77)	J1R160	9/4/2012	19.4	X	0.21	0.243		0.155	20900	X	3.7	7.8		0.26			
FS D-83:1-1	J1RN38	5/29/2013	12.7	M	0.21	0.165		0.155	21100		3.6	2.2		0.26			
FS D-83:1-2	J1RN39	5/29/2013	13.2		0.20	0.155	U	0.155	23800		3.5	1.8		0.25			
FS D-83:1-3	J1RN40	5/29/2013	11.5		0.20	0.155	U	0.155	20700		3.5	2.6		0.25			
Equipment Blank	J1R654	4/8/2013	0.39	BX	0.22				518	X	3.8	0.48	B	0.27			

Attachment	1	Sheet No.	3 of 31
Originator	N. K. Schiffern	Date	07/08/13
Checked	J. D. Skoglie	Date	07/08/13
Calc. No.	0100D-CA-V0508	Rev. No.	0

Attachment 1. 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Verification Sample Results (Metals).

Sample Area	HEIS Number	Sample Date	Magnesium			Manganese			Mercury			Molybdenum			Nickel		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-3	J1PW83	9/18/2012	4920	X	3.6	289	X	0.098	0.0074	B	0.0051	0.25	B	0.25	12.5	X	0.12
Duplicate of J1PW83	J1PW93	9/18/2012	4860	X	3.4	286	X	0.093	0.0068	B	0.0052	0.24	U	0.24	12.7	X	0.11
EXC-1	J1PW81	9/18/2012	5040	X	3.5	330	X	0.094	0.14		0.0056	0.60	B	0.24	13.1	X	0.12
EXC-2	J1PW82	9/18/2012	4600	X	3.3	305	X	0.088	0.075		0.0057	0.54	B	0.23	11.9	X	0.11
EXC-4	J1RJ77	3/15/2013	4890	X	3.5	323		0.095	0.013	B	0.0056	0.38	B	0.25	10.0		0.12
EXC-5	J1PW85	9/18/2012	5130	X	15.9	321	X	0.086	0.092		0.0060	0.48	B	0.22	12.2	X	0.11
EXC-6	J1PW86	9/18/2012	5660	X	16.5	320	X	0.089	0.022		0.0051	0.31	B	0.23	14.7	X	0.11
EXC-7	J1PW87	9/18/2012	5200	X	15.5	305	X	0.084	0.0055	B	0.0050	0.29	B	0.22	12.5	X	0.10
EXC-8	J1PW88	9/18/2012	5400	X	16.6	324	X	0.090	0.0062	B	0.0057	0.33	B	0.23	11.0	X	0.11
EXC-9	J1PW89	9/18/2012	5480	X	17.3	318	X	0.093	0.027		0.0060	0.26	B	0.24	12.1	X	0.11
EXC-10	J1PW90	9/18/2012	5760	X	17.6	388	X	0.095	0.0089	B	0.0058	0.27	B	0.25	14.5	X	0.12
EXC-11	J1PW91	9/18/2012	5450	X	18.5	322	X	0.10	0.0064	U	0.0064	0.31	B	0.26	13.5	X	0.12
EXC-12	J1PW92	9/18/2012	4080	X	3.2	271	X	0.086	0.020		0.0055	0.28	B	0.22	10.3	X	0.11
Split of J1PW83	J1PWF8	9/18/2012	4000		66.2	242		4.41	0.0266	U	0.0266	0.357	B	1.76	9.49		3.53
SPA-5	J1R645	4/8/2013	4030	X	3.4	260	X	0.091	0.0096	B	0.0058	0.24	U	0.24	9.5	X	0.11
Duplicate of J1R645	J1R653	4/8/2013	3790	X	3.4	254	X	0.091	0.0088	B	0.0060	0.24	U	0.24	7.3	X	0.11
SPA-1	J1R641	4/8/2013	4300	X	3.3	295	X	0.088	0.011	BM	0.0054	0.24	B	0.23	9.5	XM	0.11
SPA-2	J1R642	4/8/2013	4000	X	3.4	280	X	0.093	0.043		0.0063	0.35	B	0.24	8.8	X	0.11
SPA-3	J1R643	4/8/2013	4020	X	3.4	284	X	0.091	0.036		0.0064	0.46	B	0.24	8.2	X	0.11
SPA-4	J1R644	4/8/2013	3710	X	3.8	264	X	0.10	0.0056	U	0.0056	0.27	U	0.27	7.1	X	0.13
SPA-6	J1R646	4/8/2013	3950	X	3.8	273	X	0.10	0.022		0.0060	0.32	B	0.27	8.2	X	0.13
SPA-7	J1R647	4/8/2013	3940	X	3.5	249	X	0.096	0.0055	U	0.0055	0.25	U	0.25	10.1	X	0.12
SPA-8	J1RKM8	4/29/2013	4190	X	3.4	308	X	0.091	0.0054	U	0.0054	0.24	U	0.24	9.6	X	0.11
SPA-9	J1RKM9	4/29/2013	4460	X	3.4	291	X	0.091	0.011	B	0.0051	0.24	U	0.24	10.0	X	0.11
SPA-10	J1RKM6	4/29/2013	4390	X	3.6	292	X	0.099	0.0085	B	0.0059	0.33	B	0.26	9.9	X	0.12
SPA-11	J1RKM7	4/29/2013	4460	X	3.5	265	X	0.096	0.0070	B	0.0062	0.25	U	0.25	12.9	X	0.12
SPA-12	J1RKM5	4/29/2013	4300	X	3.5	273	X	0.095	0.0048	U	0.0048	0.33	B	0.25	10.9	X	0.12
Split of J1R645	J1R670	4/8/2013	3830		17.6	263	N	0.33	0.015	B	0.011	0.67	U	0.67	8.8		0.48
FS-1	J1RJ78	3/15/2013	4400	X	3.4	298		0.091	0.013	B	0.0057	0.39	B	0.24	8.0		0.11
FS-2	J1PWC9	9/18/2012	4710	X	3.4	307	X	0.092	0.054		0.0059	0.51	B	0.24	10.8	X	0.11
FS-3	J1PWD0	9/18/2012	4580	X	3.5	314	X	0.094	0.032		0.0058	0.34	B	0.24	9.4	X	0.12
FS-4	J1PWD1	9/18/2012	5190	X	3.6	337	X	0.098	0.015	B	0.0052	0.41	B	0.25	10.8	X	0.12
FS-5	J1PWD2	9/18/2012	3200	X	3.6	227	X	0.096	0.0055	U	0.0055	0.37	B	0.25	5.4	X	0.12
FS-6	J1PWD3	9/18/2012	4230	X	3.4	321	X	0.091	0.13		0.0052	0.30	B	0.24	8.1	X	0.11
FS-5 (100-D-77)	J1R160	9/4/2012	4290	X	3.6	287	X	0.096	0.15		0.0059	0.35	B	0.25	8.6	X	0.12
FS D-83:1-1	J1RN38	5/29/2013	3720		3.5	262		0.096	0.0059	UN	0.0059	0.25	U	0.25	7.6	M	0.12
FS D-83:1-2	J1RN39	5/29/2013	3960		3.4	310		0.093	0.0063	U	0.0063	0.24	U	0.24	9.1		0.11
FS D-83:1-3	J1RN40	5/29/2013	4370		3.4	281		0.092	0.0065	U	0.0065	0.24	U	0.24	10.2		0.11
Equipment Blank	J1R654	4/8/2013	24.2	X	3.7	5.0	X	0.10	0.0048	U	0.0048	0.26	U	0.26	0.40	BX	0.12

Attachment	1	Sheet No.	4 of 31
Originator	N. K. Schiffern	Date	07/08/13
Checked	J. D. Skoglie	Date	07/08/13
Calc. No.	0100D-CA-V0508	Rev. No.	0

Attachment 1. 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Verification Sample Results (Metals).

Sample Area	HEIS Number	Sample Date	Potassium			Selenium			Silicon			Silver			Sodium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-3	J1PW83	9/18/2012	1050		40.0	0.84	U	0.84	376	XJ	5.5	0.16	U	0.16	280		57.6
Duplicate of J1PW83	J1PW93	9/18/2012	1090		38.2	0.80	U	0.80	424	XJ	5.3	0.15	U	0.15	269		55.0
EXC-1	J1PW81	9/18/2012	1280		38.3	0.80	U	0.80	538	NXJ	5.3	0.15	U	0.15	258		55.2
EXC-2	J1PW82	9/18/2012	919		36.2	0.76	U	0.76	371	XJ	5.0	0.14	U	0.14	334		52.1
EXC-4	J1RJ77	3/15/2013	588		38.8	0.81	U	0.81	134	N	5.4	0.15	U	0.15	282		55.8
EXC-5	J1PW85	9/18/2012	858		35.3	0.74	U	0.74	418	XJ	4.9	0.14	U	0.14	335		50.8
EXC-6	J1PW86	9/18/2012	856		36.6	0.77	U	0.77	318	XJ	5.1	0.14	U	0.14	262		52.7
EXC-7	J1PW87	9/18/2012	732		34.5	0.72	U	0.72	329	XJ	4.8	0.13	U	0.13	354		49.6
EXC-8	J1PW88	9/18/2012	645		36.8	0.77	U	0.77	209	XJ	5.1	0.14	U	0.14	301		53.0
EXC-9	J1PW89	9/18/2012	865		38.3	0.80	U	0.80	348	XJ	5.3	0.15	U	0.15	295		55.1
EXC-10	J1PW90	9/18/2012	918		39.0	0.82	U	0.82	434	XJ	5.4	0.15	U	0.15	351		56.1
EXC-11	J1PW91	9/18/2012	600		40.9	0.86	U	0.86	203	XJ	5.6	0.16	U	0.16	266		58.8
EXC-12	J1PW92	9/18/2012	770		35.3	0.74	U	0.74	349	XJ	4.9	0.14	U	0.14	337		50.8
Split of J1PW83	J1PWF8	9/18/2012	944		353	0.265	U	0.265	256		1.76	0.176	U	0.176	232		44.1
SPA-5	J1R645	4/8/2013	786		37.5	0.79	U	0.79	104	N	5.2	0.15	U	0.15	275		54.0
Duplicate of J1R645	J1R653	4/8/2013	735		37.2	0.78	U	0.78	137	N	5.1	0.15	U	0.15	219		53.5
SPA-1	J1R641	4/8/2013	920		36.2	0.76	U	0.76	128	N	5.0	0.14	U	0.14	230		52.1
SPA-2	J1R642	4/8/2013	1020		37.9	0.80	U	0.80	114	N	5.2	0.15	U	0.15	290		54.6
SPA-3	J1R643	4/8/2013	847		37.1	0.78	U	0.78	109	N	5.1	0.14	U	0.14	309		53.5
SPA-4	J1R644	4/8/2013	566		42.1	0.88	U	0.88	116	N	5.8	0.16	U	0.16	312		60.6
SPA-6	J1R646	4/8/2013	889		42.0	0.88	U	0.88	118	N	5.8	0.16	U	0.16	258		60.4
SPA-7	J1R647	4/8/2013	638		39.2	0.82	U	0.82	93.8	N	5.4	0.15	U	0.15	247		56.5
SPA-8	J1RKM8	4/29/2013	1140		37.2	0.78	U	0.78	293		5.1	0.15	U	0.15	206		53.5
SPA-9	J1RKM9	4/29/2013	940		37.2	0.78	U	0.78	356		5.1	0.15	U	0.15	190		53.5
SPA-10	J1RKM6	4/29/2013	945		40.4	0.85	U	0.85	325		5.6	0.16	U	0.16	228		58.1
SPA-11	J1RKM7	4/29/2013	958		39.2	0.82	U	0.82	389		5.4	0.15	U	0.15	164		56.5
SPA-12	J1RKM5	4/29/2013	977		38.9	0.82	U	0.82	304	N	5.4	0.15	U	0.15	194		56.0
Split of J1R645	J1R670	4/8/2013	837	BN	715	0.61	U	0.61	1100		8.2	0.5	U	0.5	279	N	99.9
FS-1	J1RJ78	3/15/2013	567		37.2	0.78	U	0.78	128	N	5.1	0.15	U	0.15	350		53.5
FS-2	J1PWC9	9/18/2012	780		37.7	0.79	U	0.79	548	XN	5.2	0.15	U	0.15	371		54.3
FS-3	J1PWD0	9/18/2012	710		38.5	0.81	U	0.81	437	XN	5.3	0.15	U	0.15	335		55.4
FS-4	J1PWD1	9/18/2012	776		40.1	0.84	U	0.84	385	XN	5.5	0.16	U	0.16	296		57.8
FS-5	J1PWD2	9/18/2012	573		39.5	0.83	U	0.83	265	XN	5.4	0.15	U	0.15	577		56.8
FS-6	J1PWD3	9/18/2012	597		37.5	0.79	U	0.79	299	XN	5.2	0.15	U	0.15	325		53.9
FS-5 (100-D-77)	J1R160	9/4/2012	1090		39.4	0.83	U	0.83	130	N	5.4	0.15	U	0.15	641		56.7
FS D-83:1-1	J1RN38	5/29/2013	556		39.2	0.82	U	0.82	307	N	5.4	0.15	U	0.15	237	M	56.4
FS D-83:1-2	J1RN39	5/29/2013	442		38.2	0.80	U	0.80	176	N	5.3	0.15	U	0.15	210		54.9
FS D-83:1-3	J1RN40	5/29/2013	713		37.6	0.79	U	0.79	345	N	5.2	0.15	U	0.15	208		54.1
Equipment Blank	J1R654	4/8/2013	46.9	B	41.1	0.86	U	0.86	125	N	5.7	0.16	U	0.16	59.1	U	59.1

Attachment	1	Sheet No.	5 of 31
Originator	N. K. Schiffern	Date	07/08/13
Checked	J. D. Skoglie	Date	07/08/13
Calc. No.	0100D-CA-V0508	Rev. No.	0

Attachment 1. 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Verification Sample Results (Metals).

Sample Area	HEIS Number	Sample Date	Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-3	J1PW83	9/18/2012	40.4		0.092	35.0	X	0.39
Duplicate of J1PW83	J1PW93	9/18/2012	41.6		0.088	34.8	X	0.37
EXC-1	J1PW81	9/18/2012	54.9		0.088	65.7	X	0.37
EXC-2	J1PW82	9/18/2012	65.0		0.083	48.8	X	0.35
EXC-4	J1RJ77	3/15/2013	75.3		0.44	47.4	X	0.38
EXC-5	J1PW85	9/18/2012	71.8		0.40	53.5	X	0.34
EXC-6	J1PW86	9/18/2012	71.6		0.42	42.9	X	0.36
EXC-7	J1PW87	9/18/2012	71.2		0.40	41.5	X	0.33
EXC-8	J1PW88	9/18/2012	84.8		0.42	44.6	X	0.36
EXC-9	J1PW89	9/18/2012	73.9		0.44	44.7	X	0.37
EXC-10	J1PW90	9/18/2012	75.0		0.45	45.2	X	0.38
EXC-11	J1PW91	9/18/2012	85.4		0.47	45.3	X	0.40
EXC-12	J1PW92	9/18/2012	58.0		0.081	39.6	X	0.34
Split of J1PW83	J1PWF8	9/18/2012	36.7		2.21	30.8		8.82
SPA-5	J1R645	4/8/2013	52.6	X	0.086	38.5	X	0.36
Duplicate of J1R645	J1R653	4/8/2013	49.5	X	0.085	37.8	X	0.36
SPA-1	J1R641	4/8/2013	51.1	X	0.083	44.5	X	0.35
SPA-2	J1R642	4/8/2013	53.9	X	0.087	45.3	X	0.37
SPA-3	J1R643	4/8/2013	55.2	X	0.085	51.3	X	0.36
SPA-4	J1R644	4/8/2013	58.0	X	0.097	39.4	X	0.41
SPA-6	J1R646	4/8/2013	53.6	X	0.096	43.2	X	0.41
SPA-7	J1R647	4/8/2013	51.5	X	0.09	36.9	X	0.38
SPA-8	J1RKM8	4/29/2013	45.5		0.085	38.2	X	0.36
SPA-9	J1RKM9	4/29/2013	45.4		0.085	39.6	X	0.36
SPA-10	J1RKM6	4/29/2013	46.2		0.093	36.2	X	0.39
SPA-11	J1RKM7	4/29/2013	40.0		0.090	33.5	X	0.38
SPA-12	J1RKM5	4/29/2013	46.8		0.089	37.3	X	0.38
Split of J1R645	J1R670	4/8/2013	44.8	N	2.7	37.4	N	4.2
FS-1	J1RJ78	3/15/2013	76.1		0.43	47.4	X	0.36
FS-2	J1PWC9	9/18/2012	80.0		0.43	46.9	X	0.37
FS-3	J1PWD0	9/18/2012	80.4		0.44	43.4	X	0.37
FS-4	J1PWD1	9/18/2012	89.0		0.46	48.2	X	0.39
FS-5	J1PWD2	9/18/2012	113		0.45	44.0	X	0.38
FS-6	J1PWD3	9/18/2012	82.8		0.43	46.5	X	0.36
FS-5 (100-D-77)	J1R160	9/4/2012	59.8	X	0.090	47.2	X	0.38
FS D-83:1-1	J1RN38	5/29/2013	52.6		0.090	36.9		0.38
FS D-83:1-2	J1RN39	5/29/2013	63.8		0.088	43.6		0.37
FS D-83:1-3	J1RN40	5/29/2013	57.4		0.086	38.4		0.36
Equipment Blank	J1R654	4/8/2013	0.46	BX	0.094	1.5	X	0.40

Attachment	1	Sheet No.	6 of 31
Originator	N. K. Schiffern	Date	07/08/13
Checked	J. D. Skoglie	Date	07/08/13
Calc. No.	0100D-CA-V0508	Rev. No.	0

Attachment 1. 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Verification Sample Results (Anions).

Sample Area	HEIS Number	Sample Date	Bromide			Chloride			Fluoride			Nitrate			Nitrite			Nitrogen in Nitrate		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-3	J1PW83	9/18/2012	0.38	U	0.38	1.9	U	1.9	0.80	U	0.80							0.67	BJ	0.31
Duplicate of J1PW83	J1PW93	9/18/2012	0.36	U	0.36	1.8	U	1.8	0.77	U	0.77							0.57	BJ	0.29
EXC-1	J1PW81	9/18/2012	0.38	U	0.38	1.9	U	1.9	0.92	BN	0.81							0.77	BJ	0.31
EXC-2	J1PW82	9/18/2012	0.38	U	0.38	4.8	B	1.9	0.80	U	0.80							2.6	BJ	0.31
EXC-4	J1RJ77	3/15/2013	0.39	U	0.39	2.7	B	2.0	0.83	U	0.83							0.71	B	0.32
EXC-5	J1PW85	9/18/2012	0.39	U	0.39	2.0	U	2.0	0.82	U	0.82							1.0	BJ	0.31
EXC-6	J1PW86	9/18/2012	0.38	U	0.38	3.8	B	1.9	0.80	U	0.80							0.95	BJ	0.30
EXC-7	J1PW87	9/18/2012	0.39	U	0.39	2.0	U	2.0	0.83	U	0.83							0.84	BJ	0.32
EXC-8	J1PW88	9/18/2012	0.39	U	0.39	2.0	U	2.0	0.83	U	0.83							0.49	BJ	0.32
EXC-9	J1PW89	9/18/2012	0.37	U	0.37	1.9	U	1.9	0.78	U	0.78							0.58	BJ	0.30
EXC-10	J1PW90	9/18/2012	0.37	U	0.37	1.9	U	1.9	0.77	U	0.77							0.57	BJ	0.30
EXC-11	J1PW91	9/18/2012	0.37	U	0.37	1.9	U	1.9	0.79	U	0.79							0.30	UR	0.30
EXC-12	J1PW92	9/18/2012	0.38	U	0.38	1.9	U	1.9	0.83	B	0.80							1.7	BJ	0.31
Split of J1PW83	J1PWF8	9/18/2012	1.0	U	1.0	1.0	U	1.0	1.0	U	1.0	1.5	B	1.0	1.0	UR	1.0			
SPA-5	J1R645	4/8/2013	0.40	U	0.40	5.9		2.0	0.84	U	0.84							1.2	B	0.32
Duplicate of J1R645	J1R653	4/8/2013	0.40	U	0.40	6.5		2.0	0.85	U	0.85							1.3	B	0.32
SPA-1	J1R641	4/8/2013	0.39	U	0.39	3.1	B	2.0	0.82	U	0.82							0.99	B	0.31
SPA-2	J1R642	4/8/2013	0.40	U	0.40	3.9	B	2.0	0.84	U	0.84							1.7	B	0.32
SPA-3	J1R643	4/8/2013	0.41	U	0.41	7.3		2.1	0.87	U	0.87							3.2		0.33
SPA-4	J1R644	4/8/2013	0.39	U	0.39	2.9	B	2.0	0.84	U	0.84							0.90	B	0.32
SPA-6	J1R646	4/8/2013	3.4		0.42	19.1		2.1	0.89	U	0.89							1.9	B	0.34
SPA-7	J1R647	4/8/2013	2.1		0.41	9.2		2.1	0.87	U	0.87							0.94	B	0.33
SPA-8	J1RKM8	4/29/2013	0.38	U	0.38	4.2	B	1.9	0.81	U	0.81							0.96	B	0.31
SPA-9	J1RKM9	4/29/2013	0.39	U	0.39	4.1	B	2.0	0.83	U	0.83							0.80	B	0.32
SPA-10	J1RKM6	4/29/2013	0.38	U	0.38	14.1		1.9	0.81	U	0.81							1.5	B	0.31
SPA-11	J1RKM7	4/29/2013	0.39	U	0.39	4.3	B	2.0	0.83	U	0.83							0.82	B	0.32
SPA-12	J1RKM5	4/29/2013	0.39	UN	0.39	4.2	BN	2.0	0.83	UN	0.83							0.99	BN	0.32
Split of J1R645	J1R670	4/8/2013	0.26	U	0.26	5.0		0.21	0.38	B	0.10							0.60		0.042
FS-1	J1RJ78	3/15/2013	0.40	U	0.40	2.7	B	2.1	0.86	U	0.86							0.33	UR	0.33
FS-2	J1PWC9	9/18/2012	0.38	U	0.38	15.5		1.9	0.81	U	0.81							2.4	B	0.31
FS-3	J1PWD0	9/18/2012	0.39	U	0.39	4.9	B	2.0	0.82	B	0.82							1.4	B	0.32
FS-4	J1PWD1	9/18/2012	0.38	U	0.38	1.9	U	1.9	1.4	B	0.80							0.88	B	0.31
FS-5	J1PWD2	9/18/2012	0.38	U	0.38	2.0	U	2.0	0.81	U	0.81							0.98	B	0.31
FS-6	J1PWD3	9/18/2012	0.38	U	0.38	1.9	U	1.9	0.81	U	0.81							0.86	B	0.31
FS-5 (100-D-77)	J1R160	9/4/2012	0.40	U	0.40	2.3	B	2.0	0.85	UN	0.85							0.82	B	0.33
FS D-83:1-1	J1RN38	5/29/2013	0.40	U	0.40	2.0	U	2.0	0.85	U	0.85							0.32	UR	0.32
FS D-83:1-2	J1RN39	5/29/2013	0.40	U	0.40	2.0	U	2.0	1.3	B	0.84							0.32	UR	0.32
FS D-83:1-3	J1RN40	5/29/2013	0.41	U	0.41	4.8	B	2.1	0.87	U	0.87							0.33	UR	0.33

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Attachment 1. 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Verification Sample Results (Anions).

Sample Area	HEIS Number	Sample Date	Nitrogen in Nitrite and Nitrate			Nitrogen in Nitrite			Phosphate			Phosphorous in phosphate			Sulfate			TPH - Diesel		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL
EXC-3	J1PW83	9/18/2012	1.2	N	0.30	0.33	UR	0.33				1.2	UR	1.2	1.7	U	1.7	24000		630
Duplicate of J1PW83	J1PW93	9/18/2012	1.3		0.30	0.31	UR	0.31				1.2	UR	1.2	1.6	U	1.6	3000	J	660
EXC-1	J1PW81	9/18/2012	1.6	N	0.31	0.33	UR	0.33				1.2	UNR	1.2	1.7	U	1.7	1800	J	680
EXC-2	J1PW82	9/18/2012	3.3		0.30	0.33	UR	0.33				1.2	UR	1.2	81.7		1.7	1900	J	680
EXC-4	J1RJ77	3/15/2013	0.30	U	0.30	0.34	UR	0.34				1.3	UR	1.3	9.7		1.7	4100		680
EXC-5	J1PW85	9/18/2012	7.8		0.31	0.34	UR	0.34				1.2	UR	1.2	34.3		1.7	5300		670
EXC-6	J1PW86	9/18/2012	1.4		0.32	0.33	UR	0.33				1.2	UR	1.2	51.5		1.7	2200	J	650
EXC-7	J1PW87	9/18/2012	1.3		0.31	0.34	UR	0.34				1.3	UR	1.3	9.9		1.7	1600	J	670
EXC-8	J1PW88	9/18/2012	1.0		0.31	0.34	UR	0.34				1.2	UR	1.2	1.7	U	1.7	770	J	690
EXC-9	J1PW89	9/18/2012	1.1		0.30	0.32	UR	0.32				1.2	UR	1.2	1.6	U	1.6	1100	J	670
EXC-10	J1PW90	9/18/2012	1.2		0.31	0.32	UR	0.32				1.2	UR	1.2	1.6	U	1.6	670	U	670
EXC-11	J1PW91	9/18/2012	1.2		0.31	0.32	UR	0.32				1.2	UR	1.2	1.7	U	1.7	1000	J	630
EXC-12	J1PW92	9/18/2012	2.6		0.30	0.33	UR	0.33				1.2	UR	1.2	8.1		1.7	660	U	660
Split of J1PW83	J1PWF8	9/18/2012	0.46	B	0.10				2.0	UR	2.0				5.5		1.0	9800		3310
SPA-5	J1R645	4/8/2013	0.85	C	0.31	0.34	UR	0.34				1.3	UR	1.3	11.4		1.8	3900	JB	700
Duplicate of J1R645	J1R653	4/8/2013	1.1	C	0.31	0.35	UR	0.35				1.3	UR	1.3	11.9		1.8	4500	B	670
SPA-1	J1R641	4/8/2013	0.52	BMC	0.30	0.33	UR	0.33				1.2	UR	1.2	6.6		1.7	4500	B	700
SPA-2	J1R642	4/8/2013	1.4	C	0.31	0.34	UR	0.34				1.3	UR	1.3	9.9		1.8	6800	B	700
SPA-3	J1R643	4/8/2013	3.1		0.32	0.36	UR	0.36				1.3	UR	1.3	36.0		1.8	7400	B	710
SPA-4	J1R644	4/8/2013	0.48	BC	0.31	0.34	UR	0.34				1.3	UR	1.3	5.3		1.8	2200	JB	700
SPA-6	J1R646	4/8/2013	1.8	C	0.32	0.36	UR	0.36				1.3	UR	1.3	10.6		1.9	6100	B	670
SPA-7	J1R647	4/8/2013	0.48	BC	0.32	0.35	UR	0.35				1.3	UR	1.3	4.5	B	1.8	3200	JB	680
SPA-8	J1RKM8	4/29/2013	0.56	B	0.30	0.33	U	0.33				1.2	U	1.2	4.2	B	1.7	5400	B	660
SPA-9	J1RKM9	4/29/2013	0.32	B	0.30	0.34	U	0.34				1.2	U	1.2	3.3	B	1.7	4200	B	660
SPA-10	J1RKM6	4/29/2013	0.30	B	0.29	0.33	U	0.33				1.2	U	1.2	5.2		1.7	6100	B	670
SPA-11	J1RKM7	4/29/2013	0.53	B	0.31	0.34	U	0.34				1.2	U	1.2	4.3	B	1.7	3100	JB	670
SPA-12	J1RKM5	4/29/2013	0.64	B	0.31	0.34	UN	0.34				1.2	U	1.2	3.2	B	1.7	3200	JB	690
Split of J1R645	J1R670	4/8/2013	0.62	NC	0.047	0.031	UR	0.031	1.4	B	0.73				11.5		0.52	350	U	350
FS-1	J1RJ78	3/15/2013	0.32	U	0.32	0.35	UR	0.35				1.3	UR	1.3	16.0		1.8	2400	J	690
FS-2	J1PWC9	9/18/2012	1.9		0.29	0.33	UR	0.33				1.2	UR	1.2	56.2		1.7	16000		670
FS-3	J1PWD0	9/18/2012	1.6		0.29	0.34	UR	0.34				1.2	UR	1.2	24.9		1.7	1400	J	650
FS-4	J1PWD1	9/18/2012	1.2		0.31	0.33	UR	0.33				1.2	UR	1.2	223		1.7	680	U	680
FS-5	J1PWD2	9/18/2012	1.2		0.29	0.33	UR	0.33				1.2	UR	1.2	3890	D	17.1	910	J	640
FS-6	J1PWD3	9/18/2012	1.0		0.29	0.33	UR	0.33				1.2	UR	1.2	14.8		1.7	1400	J	630
FS-5 (100-D-77)	J1R160	9/4/2012	0.69	B	0.32	0.35	UR	0.35				1.3	UNR	1.3	49.6		1.8	9700	B	700
FS D-83:1-1	J1RN38	5/29/2013	0.31	U	0.31	0.35	UR	0.35				1.3	UNR	1.3	10.1		1.8			
FS D-83:1-2	J1RN39	5/29/2013	0.33	U	0.33	0.34	UR	0.34				1.3	UR	1.3	325		1.8			
FS D-83:1-3	J1RN40	5/29/2013	0.32	UN	0.32	0.35	UR	0.35				1.3	UR	1.3	11.6		1.8			

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Attachment 1. 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Verification Sample Results (TPH and Physical).

Sample Area	HEIS Number	Sample Date	TPH - Diesel EXT			TPH - motor oil (HBH)			Percent Solids			Percent moisture (wet sample)			pH Measurement		
			ug/kg	Q	PQL	ug/kg	Q	PQL	%	Q	PQL	%	Q	PQL	pH	Q	PQL
EXC-3	J1PW83	9/18/2012	32000		920							0.48		0.10	9.44	J	0.100
Duplicate of J1PW83	J1PW93	9/18/2012	3900		960							0.61		0.10	9.67	J	0.100
EXC-1	J1PW81	9/18/2012	6300		990							0.97		0.10	9.16	J	0.100
EXC-2	J1PW82	9/18/2012	4600		1000							0.70		0.10	8.93	J	0.100
EXC-4	J1RJ77	3/15/2013	5400		1000							3.8		0.10	7.55		0.100
EXC-5	J1PW85	9/18/2012	16000		980							0.73		0.10	9.12	J	0.100
EXC-6	J1PW86	9/18/2012	2900	J	960							0.88		0.10	9.06	J	0.100
EXC-7	J1PW87	9/18/2012	2200	J	990							0.85		0.10	9.22	J	0.100
EXC-8	J1PW88	9/18/2012	1000	U	1000							1.4		0.10	9.45	J	0.100
EXC-9	J1PW89	9/18/2012	1200	J	990							0.91		0.10	9.43	J	0.100
EXC-10	J1PW90	9/18/2012	990	U	990							0.83		0.10	9.36	J	0.100
EXC-11	J1PW91	9/18/2012	1100	J	920							0.73		0.10	9.21	J	0.100
EXC-12	J1PW92	9/18/2012	2300	J	970							0.72		0.10	9.00	J	0.100
Split of J1PW83	J1PWF8	9/18/2012				19900		9940	99.5		0.10			0.10	9.31		0.100
SPA-5	J1R645	4/8/2013	5700	B	1000							4.1		0.10	9.36		0.100
Duplicate of J1R645	J1R653	4/8/2013	6800	B	980							4.1		0.10	9.32		0.100
SPA-1	J1R641	4/8/2013	7000	B	1000							4.0		0.10	9.27		0.100
SPA-2	J1R642	4/8/2013	16000	B	1000							4.4		0.10	9.35		0.100
SPA-3	J1R643	4/8/2013	17000	B	1000							6.5		0.10	9.22		0.100
SPA-4	J1R644	4/8/2013	2700	JB	1000							3.7		0.10	9.54		0.100
SPA-6	J1R646	4/8/2013	11000	B	990							3.3		0.10	9.20		0.100
SPA-7	J1R647	4/8/2013	4900	B	1000							3.2		0.10	9.35		0.100
SPA-8	J1RKM8	4/29/2013	11000	B	970							1.5		0.10	9.14		0.100
SPA-9	J1RKM9	4/29/2013	9300	B	980							1.6		0.10	9.26		0.100
SPA-10	J1RKM6	4/29/2013	13000	B	980							1.5		0.10	9.26		0.100
SPA-11	J1RKM7	4/29/2013	6800	B	990							1.4		0.10	9.26		0.100
SPA-12	J1RKM5	4/29/2013	3800	JB	1000							1.5		0.10	8.97		0.100
Split of J1R645	J1R670	4/8/2013				660	U	660						0.10	8.30		0.100
FS-1	J1RJ78	3/15/2013	3000	J	1000							3.2		0.10	9.42		0.100
FS-2	J1PWC9	9/18/2012	24000		990							1.1		0.10	9.13		0.100
FS-3	J1PWD0	9/18/2012	2300	J	950							1.3		0.10	9.33		0.100
FS-4	J1PWD1	9/18/2012	1000	U	1000							0.82		0.10	8.82		0.100
FS-5	J1PWD2	9/18/2012	960	J	940							2.0		0.10	6.34		0.100
FS-6	J1PWD3	9/18/2012	3900		930							0.50		0.10	9.03		0.100
FS-5 (100-D-77)	J1R160	9/4/2012	15000	B	1000							6.3		0.10	10.5		0.100
FS D-83:1-1	J1RN38	5/29/2013										4.1		0.10	9.45		0.100
FS D-83:1-2	J1RN39	5/29/2013										4.1		0.10	8.65		0.100
FS D-83:1-3	J1RN40	5/29/2013										5.9		0.10	9.36		0.100
Equipment Blank	J1R654	4/8/2013										0.24		0.10			

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Attachment 1. 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	J1PW83, EXC-3 [a]			J1PW93, Duplicate of J1PW83 [a]			J1PW81, EXC-1			J1PW82, EXC-2		
		9/18/2012			9/18/2012			9/18/2012			9/18/2012		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	190	NXJ	10	100	J	9.2	9.8	UJ	9.8	10	UJ	10
Acenaphthylene	PAH	13	JX	9.0	8.3	U	8.3	8.8	U	8.8	9.0	U	9.0
Anthracene	PAH	390	N	3.0	2.8	U	2.8	3.0	U	3.0	3.1	U	3.1
Benzo(a)anthracene	PAH	660	NJ	3.2	160	J	2.9	3.1	UJ	3.1	4.9	JX	3.2
Benzo(a)pyrene	PAH	440	NJ	6.4	80	J	5.9	6.3	UJ	6.3	7.2	JX	6.4
Benzo(b)fluoranthene	PAH	500	N	4.2	120		3.9	4.1	U	4.1	11	J	4.2
Benzo(ghi)perylene	PAH	320	N	7.2	65		6.6	7.0	U	7.0	7.2	U	7.2
Benzo(k)fluoranthene	PAH	180	N	3.9	41		3.6	3.9	U	3.9	4.0	U	4.0
Chrysene	PAH	560	NJ	4.8	130	J	4.4	4.7	UJ	4.7	7.9	JX	4.9
Dibenz[a,h]anthracene	PAH	92	X	11	15	JX	10	11	U	11	11	U	11
Fluoranthene	PAH	1200	NJ	13	240	J	12	13	UJ	13	16	J	13
Fluorene	PAH	250		5.3	71		4.8	5.2	U	5.2	5.3	U	5.3
Indeno(1,2,3-cd)pyrene	PAH	300	N	12	43	X	11	12	U	12	12	U	12
Naphthalene	PAH	12	U	12	11	U	11	12	U	12	12	U	12
Phenanthrene	PAH	1200	NJ	12	260	J	11	12	UJ	12	12	UJ	12
Pyrene	PAH	1300	NJ	12	210	J	11	12	UJ	12	18	J	12
Aroclor-1016	PCB	2.6	U	2.6	2.7	U	2.7	2.7	U	2.7	2.6	U	2.6
Aroclor-1221	PCB	7.6	U	7.6	7.8	U	7.8	7.7	U	7.7	7.5	U	7.5
Aroclor-1232	PCB	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9	1.9	U	1.9
Aroclor-1242	PCB	4.4	U	4.4	4.5	U	4.5	4.5	U	4.5	4.3	U	4.3
Aroclor-1248	PCB	4.4	U	4.4	4.5	U	4.5	4.5	U	4.5	4.3	U	4.3
Aroclor-1254	PCB	2.4	U	2.4	2.5	U	2.5	2.5	U	2.5	2.4	U	2.4
Aroclor-1260	PCB	2.4	U	2.4	2.5	U	2.5	5.4	J	2.5	2.4	U	2.4
Aldrin	PEST	0.23	U	0.23	0.23	U	0.23	0.24	U	0.24	0.24	U	0.24
Alpha-BHC	PEST	0.20	U	0.20	0.20	U	0.20	0.21	U	0.21	0.21	U	0.21
alpha-Chlordane	PEST	0.30	U	0.30	0.30	U	0.30	0.31	U	0.31	0.31	U	0.31
beta-1,2,3,4,5,6-Hexachlorocyclohexane	PEST	0.62	U	0.62	0.61	U	0.61	0.64	U	0.64	0.64	U	0.64
Delta-BHC	PEST	0.37	U	0.37	0.37	U	0.37	0.39	U	0.39	0.39	U	0.39
Dichlorodiphenyldichloroethane	PEST	0.51	U	0.51	0.51	U	0.51	0.53	U	0.53	0.53	U	0.53
Dichlorodiphenyldichloroethylene	PEST	0.22	U	0.22	0.22	U	0.22	0.23	U	0.23	0.23	U	0.23
Dichlorodiphenyltrichloroethane	PEST	0.55	U	0.55	0.55	U	0.55	0.57	U	0.57	0.57	U	0.57
Dieldrin	PEST	0.20	U	0.20	0.19	U	0.19	0.20	U	0.20	0.20	U	0.20
Endosulfan I	PEST	0.16	U	0.16	0.16	U	0.16	0.17	U	0.17	0.17	U	0.17
Endosulfan II	PEST	0.27	U	0.27	0.27	U	0.27	0.28	U	0.28	0.28	U	0.28
Endosulfan sulfate	PEST	0.26	U	0.26	0.26	U	0.26	0.27	U	0.27	0.27	U	0.27
Endrin	PEST	0.29	U	0.29	0.28	U	0.28	0.30	U	0.30	0.30	U	0.30
Endrin aldehyde	PEST	0.16	U	0.16	0.16	U	0.16	0.17	U	0.17	0.17	U	0.17
Endrin ketone	PEST	0.46	U	0.46	0.45	U	0.45	0.47	U	0.47	0.47	U	0.47
Gamma-BHC (Lindane)	PEST	0.43	U	0.43	0.43	U	0.43	0.45	U	0.45	0.45	U	0.45
gamma-Chlordane	PEST	0.25	U	0.25	0.25	U	0.25	0.26	U	0.26	0.26	U	0.26
Heptachlor	PEST	0.20	U	0.20	0.20	U	0.20	0.21	U	0.21	0.21	U	0.21
Heptachlor epoxide	PEST	0.40	U	0.40	0.39	U	0.39	0.41	U	0.41	0.41	U	0.41
Methoxychlor	PEST	0.42	U	0.42	0.42	U	0.42	0.44	U	0.44	0.44	U	0.44
Toxaphene	PEST	15	UJ	15	15	UJ	15	15	UJ	15	15	UJ	15

Attachment	1	Sheet No.	10 of 31
Originator	N. K. Schiffern	Date	07/08/13
Checked	J. D. Skoglie	Date	07/08/13
Calc. No.	0100D-CA-V0508	Rev. No.	0

Attachment 1. 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	J1RJ77, EXC-4 3/15/2013			J1PW85, EXC-5 9/18/2012			J1PW86, EXC-6 9/18/2012			J1PW87, EXC-7 9/18/2012		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	10	U	10	10	UJ	10	10	UJ	10	9.7	UJ	9.7
Acenaphthylene	PAH	9.2	U	9.2	9.0	U	9.0	9.0	U	9.0	8.7	U	8.7
Anthracene	PAH	7.5	J	3.1	22		3.1	3.1	U	3.1	3.0	U	3.0
Benzo(a)anthracene	PAH	26		3.3	58	J	3.2	3.2	UJ	3.2	3.1	UJ	3.1
Benzo(a)pyrene	PAH	23		6.6	6.4	UJ	6.4	6.4	UJ	6.4	6.2	UJ	6.2
Benzo(b)fluoranthene	PAH	25		4.3	51		4.2	4.2	U	4.2	4.1	U	4.1
Benzo(ghi)perylene	PAH	11	JX	7.4	45	X	7.2	7.2	U	7.2	7.0	U	7.0
Benzo(k)fluoranthene	PAH	9.1	J	4.0	17		3.9	3.9	U	3.9	3.8	U	3.8
Chrysene	PAH	23	J	5.0	49	J	4.8	4.9	UJ	4.9	4.7	UJ	4.7
Dibenz[a,h]anthracene	PAH	11	U	11	11	U	11	11	U	11	11	U	11
Fluoranthene	PAH	57		13	99	J	13	13	UJ	13	13	UJ	13
Fluorene	PAH	5.4	U	5.4	13	J	5.3	5.3	U	5.3	5.1	U	5.1
Indeno(1,2,3-cd)pyrene	PAH	15	J	12	31		12	12	U	12	12	U	12
Naphthalene	PAH	12	U	12	12	U	12	12	U	12	12	U	12
Phenanthrene	PAH	24	J	12	51	J	12	12	UJ	12	12	UJ	12
Pyrene	PAH	61		12	110	J	12	12	UJ	12	12	UJ	12
Aroclor-1016	PCB	2.9	U	2.9	2.7	U	2.7	2.7	U	2.7	2.8	U	2.8
Aroclor-1221	PCB	8.3	U	8.3	7.9	U	7.9	7.7	U	7.7	8.0	U	8.0
Aroclor-1232	PCB	2.1	U	2.1	2.0	U	2.0	1.9	U	1.9	2.0	U	2.0
Aroclor-1242	PCB	4.8	U	4.8	4.6	U	4.6	4.5	U	4.5	4.7	U	4.7
Aroclor-1248	PCB	4.8	U	4.8	4.6	U	4.6	4.5	U	4.5	4.7	U	4.7
Aroclor-1254	PCB	2.7	U	2.7	2.6	U	2.6	2.5	U	2.5	2.6	U	2.6
Aroclor-1260	PCB	2.7	U	2.7	7.5	JP	2.6	2.5	U	2.5	2.6	U	2.6
Aldrin	PEST	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.24	U	0.24
Alpha-BHC	PEST	0.21	U	0.21	0.21	U	0.21	0.22	U	0.22	0.21	U	0.21
alpha-Chlordane	PEST	0.32	U	0.32	0.32	U	0.32	0.33	U	0.33	0.31	U	0.31
beta-1,2,3,4,5,6-Hexachlorocyclohexane	PEST	0.66	UN	0.66	0.65	U	0.65	0.67	U	0.67	0.64	U	0.64
Delta-BHC	PEST	0.40	U	0.40	0.39	U	0.39	0.40	U	0.40	0.39	U	0.39
Dichlorodiphenyldichloroethane	PEST	0.54	U	0.54	0.54	U	0.54	0.55	U	0.55	0.53	U	0.53
Dichlorodiphenyldichloroethylene	PEST	0.24	U	0.24	0.23	U	0.23	0.24	U	0.24	0.23	U	0.23
Dichlorodiphenyltrichloroethane	PEST	0.59	U	0.59	0.58	U	0.58	0.60	U	0.60	0.57	U	0.57
Dieldrin	PEST	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.20	U	0.20
Endosulfan I	PEST	0.18	U	0.18	0.17	U	0.17	0.18	U	0.18	0.17	U	0.17
Endosulfan II	PEST	0.29	U	0.29	0.28	U	0.28	0.29	U	0.29	0.28	U	0.28
Endosulfan sulfate	PEST	0.28	UN	0.28	0.27	U	0.27	0.28	U	0.28	0.27	U	0.27
Endrin	PEST	0.31	U	0.31	0.30	U	0.30	0.31	U	0.31	0.29	U	0.29
Endrin aldehyde	PEST	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.16	U	0.16
Endrin ketone	PEST	0.49	U	0.49	0.48	U	0.48	0.49	U	0.49	0.47	U	0.47
Gamma-BHC (Lindane)	PEST	0.46	U	0.46	0.46	U	0.46	0.47	U	0.47	0.45	U	0.45
gamma-Chlordane	PEST	0.27	U	0.27	0.26	U	0.26	0.27	U	0.27	0.26	U	0.26
Heptachlor	PEST	0.21	U	0.21	0.21	U	0.21	0.22	U	0.22	0.21	U	0.21
Heptachlor epoxide	PEST	0.42	U	0.42	0.42	U	0.42	0.43	U	0.43	0.41	U	0.41
Methoxychlor	PEST	0.45	U	0.45	0.44	U	0.44	0.45	U	0.45	0.43	U	0.43
Toxaphene	PEST	16	U	16	16	UJ	16	16	UJ	16	15	UJ	15

Attachment	1	Sheet No.	11 of 31
Originator	N. K. Schiffern	Date	07/08/13
Checked	J. D. Skoglie	Date	07/08/13
Calc. No.	0100D-CA-V0508	Rev. No.	0

Attachment 1. 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	J1PW88, EXC-8			J1PW89, EXC-9			J1PW90, EXC-10			J1PW91, EXC-11		
		9/18/2012			9/18/2012			9/18/2012			9/18/2012		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	9.8	UJ	9.8	10	UJ	10	10	UJ	10	9.4	UJ	9.4
Acenaphthylene	PAH	8.8	U	8.8	9.0	U	9.0	9.0	U	9.0	8.4	U	8.4
Anthracene	PAH	3.0	U	3.0	3.0	U	3.0	3.0	U	3.0	2.9	U	2.9
Benzo(a)anthracene	PAH	3.1	UJ	3.1	3.2	UJ	3.2	3.2	UJ	3.2	3.0	UJ	3.0
Benzo(a)pyrene	PAH	6.3	UJ	6.3	6.4	UJ	6.4	6.4	UJ	6.4	6.0	UJ	6.0
Benzo(b)fluoranthene	PAH	4.1	U	4.1	6.7	JX	4.2	4.2	U	4.2	3.9	U	3.9
Benzo(ghi)perylene	PAH	7.0	U	7.0	7.2	U	7.2	7.2	U	7.2	6.7	U	6.7
Benzo(k)fluoranthene	PAH	3.9	U	3.9	3.9	U	3.9	3.9	U	3.9	3.7	U	3.7
Chrysene	PAH	4.7	UJ	4.7	9.8	JX	4.8	4.8	UJ	4.8	4.5	UJ	4.5
Dibenz[a,h]anthracene	PAH	11	U	11	11	U	11	11	U	11	10	U	10
Fluoranthene	PAH	13	UJ	13	15	J	13	13	UJ	13	12	UJ	12
Fluorene	PAH	5.2	U	5.2	5.3	U	5.3	5.3	U	5.3	4.9	U	4.9
Indeno(1,2,3-cd)pyrene	PAH	12	U	12	12	U	12	12	U	12	11	U	11
Naphthalene	PAH	12	U	12	12	U	12	12	U	12	11	U	11
Phenanthrene	PAH	12	UJ	12	12	UJ	12	12	UJ	12	11	UJ	11
Pyrene	PAH	12	UJ	12	19	J	12	12	UJ	12	11	UJ	11
Aroclor-1016	PCB	2.7	U	2.7	2.7	U	2.7	2.6	U	2.6	2.8	U	2.8
Aroclor-1221	PCB	7.9	U	7.9	7.7	U	7.7	7.5	U	7.5	8.1	U	8.1
Aroclor-1232	PCB	2.0	U	2.0	1.9	U	1.9	1.9	U	1.9	2.0	U	2.0
Aroclor-1242	PCB	4.6	U	4.6	4.5	U	4.5	4.4	U	4.4	4.7	U	4.7
Aroclor-1248	PCB	4.6	U	4.6	4.5	U	4.5	4.4	U	4.4	4.7	U	4.7
Aroclor-1254	PCB	2.6	U	2.6	2.5	U	2.5	2.4	U	2.4	2.6	U	2.6
Aroclor-1260	PCB	2.6	U	2.6	2.5	U	2.5	2.4	U	2.4	2.6	U	2.6
Aldrin	PEST	0.24	U	0.24	0.24	U	0.24	0.24	U	0.24	0.23	U	0.23
Alpha-BHC	PEST	0.20	U	0.20	0.21	U	0.21	0.21	U	0.21	0.20	U	0.20
alpha-Chlordane	PEST	0.31	U	0.31	0.31	U	0.31	0.31	U	0.31	0.30	U	0.30
beta-1,2,3,4,5,6-Hexachlorocyclohexane	PEST	0.63	U	0.63	0.65	U	0.65	0.64	U	0.64	0.62	U	0.62
Delta-BHC	PEST	0.38	U	0.38	0.39	U	0.39	0.39	U	0.39	0.37	U	0.37
Dichlorodiphenyldichloroethane	PEST	0.52	U	0.52	0.53	U	0.53	0.53	U	0.53	0.51	U	0.51
Dichlorodiphenyldichloroethylene	PEST	0.23	U	0.23	0.23	U	0.23	0.23	U	0.23	0.22	U	0.22
Dichlorodiphenyltrichloroethane	PEST	0.56	U	0.56	0.57	U	0.57	0.57	U	0.57	0.55	U	0.55
Dieldrin	PEST	0.20	U	0.20	0.20	U	0.20	0.20	U	0.20	0.19	U	0.19
Endosulfan I	PEST	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.16	U	0.16
Endosulfan II	PEST	0.27	U	0.27	0.28	U	0.28	0.28	U	0.28	0.27	U	0.27
Endosulfan sulfate	PEST	0.26	U	0.26	0.27	U	0.27	0.27	U	0.27	0.26	U	0.26
Endrin	PEST	0.29	U	0.29	0.30	U	0.30	0.29	U	0.29	0.28	U	0.28
Endrin aldehyde	PEST	0.16	U	0.16	0.17	U	0.17	0.16	U	0.16	0.16	U	0.16
Endrin ketone	PEST	0.47	U	0.47	0.48	U	0.48	0.47	U	0.47	0.45	U	0.45
Gamma-BHC (Lindane)	PEST	0.44	U	0.44	0.45	U	0.45	0.45	U	0.45	0.43	U	0.43
gamma-Chlordane	PEST	0.25	U	0.25	0.26	U	0.26	0.26	U	0.26	0.25	U	0.25
Heptachlor	PEST	0.20	U	0.20	0.21	U	0.21	0.21	U	0.21	0.20	U	0.20
Heptachlor epoxide	PEST	0.41	U	0.41	0.41	U	0.41	0.41	U	0.41	0.39	U	0.39
Methoxychlor	PEST	0.43	U	0.43	0.44	U	0.44	0.43	U	0.43	0.42	U	0.42
Toxaphene	PEST	15	UJ	15	15	UJ	15	15	UJ	15	15	UJ	15

Attachment	1	Sheet No.	12 of 31
Originator	N. K. Schiffern	Date	07/08/13
Checked	J. D. Skoglie	Date	07/08/13
Calc. No.	0100D-CA-V0508	Rev. No.	0

Attachment 1. 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	J1PW92, EXC-12			J1PWF8, Split of J1PW83			J1R645, SPA-5			J1R653, Duplicate of J1R645		
		9/18/2012			9/18/2012			4/8/2013			4/8/2013		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	9.4	UJ	9.4	1530	D	13	9.7	U	9.7	9.7	U	9.7
Acenaphthylene	PAH	8.4	U	8.4	257	D	13	8.7	U	8.7	8.7	U	8.7
Anthracene	PAH	2.9	U	2.9	348	D	13	2.9	U	2.9	3.0	U	3.0
Benzo(a)anthracene	PAH	3.0	UJ	3.0	503	D	13	3.1	U	3.1	3.1	U	3.1
Benzo(a)pyrene	PAH	6.0	UJ	6.0	493	D	13	6.2	U	6.2	6.2	U	6.2
Benzo(b)fluoranthene	PAH	3.9	U	3.9	257	D	13	4.1	U	4.1	4.1	U	4.1
Benzo(ghi)perylene	PAH	6.8	U	6.8	508	D	13	7.0	U	7.0	7.0	U	7.0
Benzo(k)fluoranthene	PAH	3.7	U	3.7	155	D	13	3.8	U	3.8	3.8	U	3.8
Chrysene	PAH	4.5	UJ	4.5	631	D	13	4.7	U	4.7	4.7	U	4.7
Dibenz[a,h]anthracene	PAH	10	U	10	37.1	D	13	11	U	11	11	U	11
Fluoranthene	PAH	12	UJ	12	1260	D	13	13	U	13	13	U	13
Fluorene	PAH	5.0	U	5.0	201	D	13	5.1	U	5.1	5.1	U	5.1
Indeno(1,2,3-cd)pyrene	PAH	11	U	11	199	D	13	12	U	12	12	U	12
Naphthalene	PAH	11	U	11	1890	D	13	12	U	12	12	U	12
Phenanthrene	PAH	11	UJ	11	1200	D	13	12	U	12	12	U	12
Pyrene	PAH	11	UJ	11	909	D	13	12	U	12	12	U	12
Aroclor-1016	PCB	2.7	U	2.7	13.4	U	13.4	2.8	U	2.8	2.8	U	2.8
Aroclor-1221	PCB	7.9	U	7.9	13.4	U	13.4	8.1	U	8.1	8.0	U	8.0
Aroclor-1232	PCB	2.0	U	2.0	13.4	U	13.4	2.0	U	2.0	2.0	U	2.0
Aroclor-1242	PCB	4.6	U	4.6	13.4	U	13.4	4.7	U	4.7	4.7	U	4.7
Aroclor-1248	PCB	4.6	U	4.6	13.4	U	13.4	4.7	U	4.7	4.7	U	4.7
Aroclor-1254	PCB	2.6	U	2.6	13.4	U	13.4	2.6	U	2.6	2.6	U	2.6
Aroclor-1260	PCB	2.6	U	2.6	13.4	U	13.4	2.6	U	2.6	2.6	U	2.6
Aroclor-1262	PCB				13.4	U	13.4						
Aroclor-1268	PCB				13.4	U	13.4						
Aldrin	PEST	0.24	U	0.24	1.33	UD	1.33	0.24	U	0.24	0.24	U	0.24
Alpha-BHC	PEST	0.20	U	0.20	1.33	UD	1.33	0.21	U	0.21	0.21	U	0.21
alpha-Chlordane	PEST	0.31	U	0.31	1.33	UD	1.33	0.31	U	0.31	0.31	U	0.31
beta-1,2,3,4,5,6-Hexachlorocyclohexane	PEST	0.63	U	0.63	1.33	UD	1.33	0.65	U	0.65	0.64	U	0.64
Delta-BHC	PEST	0.38	U	0.38	1.33	UD	1.33	0.39	U	0.39	0.39	U	0.39
Dichlorodiphenyldichloroethane	PEST	0.52	U	0.52	1.33	UD	1.33	0.53	U	0.53	0.53	U	0.53
Dichlorodiphenyldichloroethylene	PEST	0.23	U	0.23	1.33	UD	1.33	0.23	U	0.23	0.23	U	0.23
Dichlorodiphenyltrichloroethane	PEST	0.56	U	0.56	1.33	UD	1.33	0.57	U	0.57	0.57	U	0.57
Dieldrin	PEST	0.20	U	0.20	1.33	UD	1.33	0.20	U	0.20	0.20	U	0.20
Endosulfan I	PEST	0.17	U	0.17	1.33	UD	1.33	0.17	U	0.17	0.17	U	0.17
Endosulfan II	PEST	0.27	U	0.27	1.33	UD	1.33	0.28	U	0.28	0.28	U	0.28
Endosulfan sulfate	PEST	0.26	U	0.26	1.33	UD	1.33	0.27	U	0.27	0.27	U	0.27
Endrin	PEST	0.29	U	0.29	1.33	UD	1.33	0.30	U	0.30	0.30	U	0.30
Endrin aldehyde	PEST	0.16	U	0.16	1.33	UD	1.33	0.17	U	0.17	0.17	U	0.17
Endrin ketone	PEST	0.47	U	0.47	1.33	UD	1.33	0.48	U	0.48	0.47	U	0.47
Gamma-BHC (Lindane)	PEST	0.44	U	0.44	1.33	UD	1.33	0.45	U	0.45	0.45	U	0.45
gamma-Chlordane	PEST	0.25	U	0.25	1.33	UD	1.33	0.26	U	0.26	0.26	U	0.26
Heptachlor	PEST	0.20	U	0.20	1.33	UD	1.33	0.21	U	0.21	0.21	U	0.21
Heptachlor epoxide	PEST	0.41	U	0.41	1.33	UD	1.33	0.42	U	0.42	0.41	U	0.41
Methoxychlor	PEST	0.43	U	0.43	1.33	UD	1.33	0.44	U	0.44	0.44	U	0.44
Toxaphene	PEST	15	UJ	15	13.3	UD	13.3	15	U	15	15	U	15

Attachment	1	Sheet No.	13 of 31
Originator	N. K. Schiffern	Date	07/08/13
Checked	J. D. Skoglie	Date	07/08/13
Calc. No.	0100D-CA-V0508	Rev. No.	0

Attachment 1. 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	J1R641, SPA-1			J1R642, SPA-2			J1R643, SPA-3			J1R644, SPA-4		
		4/8/2013 14:35			4/8/2013 14:20			4/8/2013 14:30			4/8/2013 14:40		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	10	U	10	10	U	10	10	U	10	9.7	U	9.7
Acenaphthylene	PAH	9.0	U	9.0	9.2	U	9.2	9.4	U	9.4	8.7	U	8.7
Anthracene	PAH	3.0	U	3.0	3.1	U	3.1	3.2	U	3.2	2.9	U	2.9
Benzo(a)anthracene	PAH	3.2	U	3.2	17	X	3.3	6.7	J	3.3	3.1	U	3.1
Benzo(a)pyrene	PAH	6.4	U	6.4	23		6.6	6.7	U	6.7	6.2	U	6.2
Benzo(b)fluoranthene	PAH	4.2	U	4.2	29	X	4.3	4.8	J	4.4	4.1	U	4.1
Benzo(ghi)perylene	PAH	7.2	U	7.2	15	JX	7.4	7.5	U	7.5	7.0	U	7.0
Benzo(k)fluoranthene	PAH	3.9	U	3.9	8.6	J	4.0	4.1	U	4.1	3.8	U	3.8
Chrysene	PAH	4.8	U	4.8	20	J	4.9	8.3	J	5.1	4.7	U	4.7
Dibenz[a,h]anthracene	PAH	11	U	11	11	U	11	11	U	11	11	U	11
Fluoranthene	PAH	13	U	13	39	J	13	14	U	14	13	U	13
Fluorene	PAH	5.3	U	5.3	5.4	U	5.4	5.5	U	5.5	5.1	U	5.1
Indeno(1,2,3-cd)pyrene	PAH	12	U	12	21	J	12	13	U	13	12	U	12
Naphthalene	PAH	12	U	12	12	U	12	13	U	13	12	U	12
Phenanthrene	PAH	12	U	12	12	U	12	13	U	13	12	U	12
Pyrene	PAH	12	U	12	49		12	14	JX	13	12	U	12
Aroclor-1016	PCB	2.6	U	2.6	2.8	U	2.8	2.9	U	2.9	2.7	U	2.7
Aroclor-1221	PCB	7.6	U	7.6	8.1	U	8.1	8.4	U	8.4	7.9	U	7.9
Aroclor-1232	PCB	1.9	U	1.9	2.0	U	2.0	2.1	U	2.1	2.0	U	2.0
Aroclor-1242	PCB	4.4	U	4.4	4.7	U	4.7	4.9	U	4.9	4.6	U	4.6
Aroclor-1248	PCB	4.4	U	4.4	4.7	U	4.7	4.9	U	4.9	4.6	U	4.6
Aroclor-1254	PCB	2.5	U	2.5	2.6	U	2.6	2.7	U	2.7	2.6	U	2.6
Aroclor-1260	PCB	2.6	J	2.5	20		2.6	14		2.7	2.6	U	2.6
Aldrin	PEST	0.26	U	0.26	0.26	U	0.26	0.26	U	0.26	0.24	U	0.24
Alpha-BHC	PEST	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.21	U	0.21
alpha-Chlordane	PEST	0.34	U	0.34	0.33	U	0.33	0.33	U	0.33	0.31	U	0.31
beta-1,2,3,4,5,6-Hexachlorocyclohexane	PEST	0.69	U	0.69	0.68	U	0.68	0.68	U	0.68	0.64	U	0.64
Delta-BHC	PEST	0.42	U	0.42	0.41	U	0.41	0.41	U	0.41	0.39	U	0.39
Dichlorodiphenyldichloroethane	PEST	0.57	U	0.57	0.56	U	0.56	0.56	U	0.56	0.53	U	0.53
Dichlorodiphenyldichloroethylene	PEST	0.25	U	0.25	0.24	U	0.24	0.24	U	0.24	0.23	U	0.23
Dichlorodiphenyltrichloroethane	PEST	0.61	U	0.61	0.60	U	0.60	0.61	U	0.61	0.57	U	0.57
Dieldrin	PEST	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.20	U	0.20
Endosulfan I	PEST	0.18	U	0.18	0.18	U	0.18	0.18	U	0.18	0.17	U	0.17
Endosulfan II	PEST	0.30	U	0.30	0.29	U	0.29	0.30	U	0.30	0.28	U	0.28
Endosulfan sulfate	PEST	0.29	U	0.29	0.28	U	0.28	0.28	U	0.28	0.27	U	0.27
Endrin	PEST	0.32	U	0.32	0.31	U	0.31	0.31	U	0.31	0.30	U	0.30
Endrin aldehyde	PEST	0.18	U	0.18	0.18	U	0.18	0.18	U	0.18	0.17	U	0.17
Endrin ketone	PEST	0.51	U	0.51	0.50	U	0.50	0.50	U	0.50	0.47	U	0.47
Gamma-BHC (Lindane)	PEST	0.48	U	0.48	0.48	U	0.48	0.48	U	0.48	0.45	U	0.45
gamma-Chlordane	PEST	0.28	U	0.28	0.27	U	0.27	0.27	U	0.27	0.26	U	0.26
Heptachlor	PEST	0.22	U	0.22	0.22	U	0.22	0.22	U	0.22	0.21	U	0.21
Heptachlor epoxide	PEST	0.44	U	0.44	0.44	U	0.44	0.44	U	0.44	0.41	U	0.41
Methoxychlor	PEST	0.47	U	0.47	0.46	U	0.46	0.46	U	0.46	0.44	U	0.44
Toxaphene	PEST	16	U	16	16	U	16	16	U	16	15	U	15

Attachment	1	Sheet No.	14 of 31
Originator	N. K. Schiffern	Date	07/08/13
Checked	J. D. Skoglie	Date	07/08/13
Calc. No.	0100D-CA-V0508	Rev. No.	0

Attachment 1. 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	J1R646, SPA-6			J1R647, SPA-7			J1RKM8, SPA-8			J1RKM9, SPA-9		
		4/8/2013			4/8/2013			4/29/2013			4/29/2013		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	10	U	10	9.9	U	9.9	10	U	10	10	U	10
Acenaphthylene	PAH	9.2	U	9.2	8.9	U	8.9	9.1	U	9.1	9.0	U	9.0
Anthracene	PAH	3.1	U	3.1	3.0	U	3.0	3.1	U	3.1	3.0	U	3.0
Benzo(a)anthracene	PAH	18	X	3.3	3.1	U	3.1	3.2	U	3.2	3.2	U	3.2
Benzo(a)pyrene	PAH	33		6.6	6.3	U	6.3	6.5	U	6.5	6.4	U	6.4
Benzo(b)fluoranthene	PAH	33		4.3	4.1	U	4.1	4.3	U	4.3	4.2	U	4.2
Benzo(ghi)perylene	PAH	25	J	7.4	7.1	U	7.1	7.3	U	7.3	7.2	U	7.2
Benzo(k)fluoranthene	PAH	9.0	J	4.0	3.9	U	3.9	4.0	U	4.0	3.9	U	3.9
Chrysene	PAH	28	J	5.0	4.8	U	4.8	4.9	U	4.9	4.8	U	4.8
Dibenz[a,h]anthracene	PAH	11	U	11	11	U	11	11	U	11	11	U	11
Fluoranthene	PAH	46		13	13	U	13	13	U	13	13	U	13
Fluorene	PAH	5.4	U	5.4	5.2	U	5.2	5.4	U	5.4	5.3	U	5.3
Indeno(1,2,3-cd)pyrene	PAH	18	J	12	12	U	12	12	U	12	12	U	12
Naphthalene	PAH	12	U	12	12	U	12	12	U	12	12	U	12
Phenanthrene	PAH	12	U	12	12	U	12	12	U	12	12	U	12
Pyrene	PAH	60	X	12	12	U	12	12	U	12	12	U	12
Aroclor-1016	PCB	2.7	U	2.7	2.7	U	2.7	2.8	U	2.8	2.7	U	2.7
Aroclor-1221	PCB	7.9	U	7.9	7.7	U	7.7	8.1	U	8.1	7.8	U	7.8
Aroclor-1232	PCB	2.0	U	2.0	1.9	U	1.9	2.0	U	2.0	1.9	U	1.9
Aroclor-1242	PCB	4.6	U	4.6	4.5	U	4.5	4.7	U	4.7	4.5	U	4.5
Aroclor-1248	PCB	4.6	U	4.6	4.5	U	4.5	4.7	U	4.7	4.5	U	4.5
Aroclor-1254	PCB	2.6	U	2.6	2.5	U	2.5	2.6	U	2.6	2.5	U	2.5
Aroclor-1260	PCB	3.9	J	2.6	2.5	U	2.5	2.6	U	2.6	3.1	J	2.5
Aldrin	PEST	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25	0.25	U	0.25
Alpha-BHC	PEST	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21
alpha-Chlordane	PEST	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32	0.32	U	0.32
beta-1,2,3,4,5,6-Hexachlorocyclohexane	PEST	0.67	U	0.67	0.66	U	0.66	0.65	U	0.65	0.66	U	0.66
Delta-BHC	PEST	0.40	U	0.40	0.40	U	0.40	0.39	U	0.39	0.40	U	0.40
Dichlorodiphenyldichloroethane	PEST	0.55	U	0.55	0.55	U	0.55	0.53	U	0.53	0.54	U	0.54
Dichlorodiphenyldichloroethylene	PEST	0.24	U	0.24	0.24	U	0.24	0.23	U	0.23	0.24	U	0.24
Dichlorodiphenyltrichloroethane	PEST	0.59	U	0.59	0.59	U	0.59	0.58	U	0.58	0.59	U	0.59
Dieldrin	PEST	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21
Endosulfan I	PEST	0.18	U	0.18	0.18	U	0.18	0.17	U	0.17	0.18	U	0.18
Endosulfan II	PEST	0.29	U	0.29	0.29	U	0.29	0.28	U	0.28	0.29	U	0.29
Endosulfan sulfate	PEST	0.28	U	0.28	0.28	U	0.28	0.27	U	0.27	0.27	U	0.27
Endrin	PEST	0.31	U	0.31	0.31	U	0.31	0.30	U	0.30	0.30	U	0.30
Endrin aldehyde	PEST	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17
Endrin ketone	PEST	0.49	U	0.49	0.49	U	0.49	0.48	U	0.48	0.49	U	0.49
Gamma-BHC (Lindane)	PEST	0.47	U	0.47	0.46	U	0.46	0.45	U	0.45	0.46	U	0.46
gamma-Chlordane	PEST	0.27	U	0.27	0.27	U	0.27	0.26	U	0.26	0.26	U	0.26
Heptachlor	PEST	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21
Heptachlor epoxide	PEST	0.43	U	0.43	0.43	U	0.43	0.42	U	0.42	0.42	U	0.42
Methoxychlor	PEST	0.45	U	0.45	0.45	U	0.45	0.44	U	0.44	0.45	U	0.45
Toxaphene	PEST	16	U	16	16	U	16	15	U	15	16	U	16

Attachment	1	Sheet No.	15 of 31
Originator	N. K. Schiffern	Date	07/08/13
Checked	J. D. Skoglie	Date	07/08/13
Calc. No.	0100D-CA-V0508	Rev. No.	0

Attachment 1. 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	J1RKM6, SPA-10			J1RKM7, SPA-11			J1RKM5, SPA-12			J1R670, Split of J1R645		
		4/29/2013			4/29/2013			4/29/2013			4/8/2013		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	9.9	U	9.9	9.9	U	9.9	10	U	10	23	J	20
Acenaphthylene	PAH	8.9	U	8.9	8.9	U	8.9	9.0	U	9.0	28	U	28
Anthracene	PAH	3.0	U	3.0	3.0	U	3.0	3.1	U	3.1	5.8	J	3.1
Benzo(a)anthracene	PAH	3.2	U	3.2	3.2	U	3.2	3.2	U	3.2	11	J	3.1
Benzo(a)pyrene	PAH	6.4	U	6.4	6.3	U	6.3	6.4	U	6.4	15	J	3.1
Benzo(b)fluoranthene	PAH	4.2	U	4.2	4.2	U	4.2	4.2	U	4.2	17		3.1
Benzo(ghi)perylene	PAH	7.1	U	7.1	7.1	U	7.1	7.2	U	7.2	10	J	3.1
Benzo(k)fluoranthene	PAH	3.9	U	3.9	3.9	U	3.9	3.9	U	3.9	6.4	J	3.1
Chrysene	PAH	4.8	U	4.8	4.8	U	4.8	5.0	J	4.8	16		3.1
Dibenz[a,h]anthracene	PAH	11	U	11	11	U	11	11	U	11	6.2	U	6.2
Fluoranthene	PAH	13	U	13	13	U	13	13	U	13	35		6.2
Fluorene	PAH	5.2	U	5.2	5.2	U	5.2	5.3	U	5.3	6.2	U	6.2
Indeno(1,2,3-cd)pyrene	PAH	12	U	12	12	U	12	12	U	12	11	J	3.1
Naphthalene	PAH	12	U	12	12	U	12	12	U	12	30	J	23
Phenanthrene	PAH	12	U	12	12	U	12	12	U	12	23	J	6.2
Pyrene	PAH	12	U	12	12	U	12	12	U	12	27	JN	3.1
Aroclor-1016	PCB	2.6	U	2.6	2.7	U	2.7	2.7	U	2.7	9.1	U	9.1
Aroclor-1221	PCB	7.4	U	7.4	7.9	U	7.9	7.9	U	7.9	9.1	U	9.1
Aroclor-1232	PCB	1.9	U	1.9	2.0	U	2.0	2.0	U	2.0	9.1	U	9.1
Aroclor-1242	PCB	4.3	U	4.3	4.6	U	4.6	4.6	U	4.6	9.1	U	9.1
Aroclor-1248	PCB	4.3	U	4.3	4.6	U	4.6	4.6	U	4.6	9.1	U	9.1
Aroclor-1254	PCB	2.4	U	2.4	2.6	U	2.6	2.6	U	2.6	5.7	U	5.7
Aroclor-1260	PCB	2.4	U	2.4	14		2.6	2.6	U	2.6	5.7	U	5.7
Aldrin	PEST	0.24	U	0.24	0.24	U	0.24	0.25	U	0.25	0.32	U	0.32
Alpha-BHC	PEST	0.20	U	0.20	0.21	U	0.21	0.21	U	0.21	0.19	U	0.19
alpha-Chlordane	PEST	0.31	U	0.31	0.31	U	0.31	0.32	U	0.32	0.59	U	0.59
beta-1,2,3,4,5,6-Hexachlorocyclohexane	PEST	0.63	U	0.63	0.64	U	0.64	0.65	U	0.65	0.31	U	0.31
Chlordane	PEST										3.9	U	3.9
Delta-BHC	PEST	0.38	U	0.38	0.39	U	0.39	0.39	U	0.39	0.25	U	0.25
Dichlorodiphenyldichloroethane	PEST	0.52	U	0.52	0.53	U	0.53	0.54	U	0.54	0.23	U	0.23
Dichlorodiphenyldichloroethylene	PEST	0.23	U	0.23	0.23	U	0.23	0.23	U	0.23	0.41	U	0.41
Dichlorodiphenyltrichloroethane	PEST	0.56	U	0.56	0.57	U	0.57	0.58	U	0.58	0.65	U	0.65
Dieldrin	PEST	0.20	U	0.20	0.20	U	0.20	0.21	U	0.21	0.22	U	0.22
Endosulfan I	PEST	0.17	U	0.17	0.17	U	0.17	0.17	U	0.17	0.59	U	0.59
Endosulfan II	PEST	0.27	U	0.27	0.28	U	0.28	0.28	U	0.28	0.24	U	0.24
Endosulfan sulfate	PEST	0.26	U	0.26	0.27	U	0.27	0.27	U	0.27	0.35	U	0.35
Endrin	PEST	0.29	U	0.29	0.30	U	0.30	0.30	U	0.30	0.16	U	0.16
Endrin aldehyde	PEST	0.16	U	0.16	0.17	U	0.17	0.17	U	0.17	0.40	U	0.40
Endrin ketone	PEST	0.47	U	0.47	0.47	U	0.47	0.48	U	0.48	0.43	U	0.43
Gamma-BHC (Lindane)	PEST	0.44	U	0.44	0.45	U	0.45	0.46	U	0.46	0.17	U	0.17
gamma-Chlordane	PEST	0.25	U	0.25	0.26	U	0.26	0.26	U	0.26	0.16	U	0.16
Heptachlor	PEST	0.20	U	0.20	0.21	U	0.21	0.21	U	0.21	0.21	U	0.21
Heptachlor epoxide	PEST	0.41	U	0.41	0.41	U	0.41	0.42	U	0.42	0.45	U	0.45
Methoxychlor	PEST	0.43	U	0.43	0.44	U	0.44	0.44	U	0.44	0.75	U	0.75
Toxaphene	PEST	15	U	15	15	U	15	16	U	16	16	U	16

Attachment	1	Sheet No.	16 of 31
Originator	N. K. Schiffern	Date	07/08/13
Checked	J. D. Skoglie	Date	07/08/13
Calc. No.	0100D-CA-V0508	Rev. No.	0

Attachment 1. 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	J1RJ78, FS-1			J1PWC9, FS-2			J1PWD0, FS-3			J1PWD1, FS-4		
		3/15/2013			9/18/2012			9/18/2012			9/18/2012		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	9.8	U	9.8	9.7	U	9.7	9.8	U	9.8	10	U	10
Acenaphthylene	PAH	8.8	U	8.8	8.8	U	8.8	8.8	U	8.8	9.0	U	9.0
Anthracene	PAH	3.0	U	3.0	3.0	U	3.0	3.0	U	3.0	3.0	U	3.0
Benzo(a)anthracene	PAH	11	JX	3.1	3.1	U	3.1	3.1	U	3.1	3.2	U	3.2
Benzo(a)pyrene	PAH	16		6.3	6.2	U	6.2	6.3	U	6.3	10	J	6.4
Benzo(b)fluoranthene	PAH	17	X	4.1	7.3	JX	4.1	4.1	U	4.1	15	X	4.2
Benzo(ghi)perylene	PAH	7.1	U	7.1	7.0	U	7.0	7.0	U	7.0	7.2	U	7.2
Benzo(k)fluoranthene	PAH	3.9	U	3.9	3.8	U	3.8	3.9	U	3.9	12	J	3.9
Chrysene	PAH	15	JX	4.7	6.0	JX	4.7	4.7	U	4.7	18	J	4.8
Dibenz[a,h]anthracene	PAH	11	U	11	11	U	11	11	U	11	11	U	11
Fluoranthene	PAH	34	J	13	13	U	13	13	U	13	21	J	13
Fluorene	PAH	5.2	U	5.2	5.1	U	5.1	5.2	U	5.2	5.3	U	5.3
Indeno(1,2,3-cd)pyrene	PAH	14	J	12	12	U	12	12	U	12	12	U	12
Naphthalene	PAH	12	U	12	12	U	12	12	U	12	12	U	12
Phenanthrene	PAH	12	U	12	12	U	12	12	U	12	12	U	12
Pyrene	PAH	40		12	14	J	12	12	U	12	20	J	12
Aroclor-1016	PCB	2.8	U	2.8	2.6	U	2.6	2.6	U	2.6	2.7	U	2.7
Aroclor-1221	PCB	8.2	U	8.2	7.6	U	7.6	7.4	U	7.4	7.8	U	7.8
Aroclor-1232	PCB	2.0	U	2.0	1.9	U	1.9	1.8	U	1.8	1.9	U	1.9
Aroclor-1242	PCB	4.8	U	4.8	4.4	U	4.4	4.3	U	4.3	4.5	U	4.5
Aroclor-1248	PCB	4.8	U	4.8	4.4	U	4.4	4.3	U	4.3	4.5	U	4.5
Aroclor-1254	PCB	2.7	U	2.7	2.5	U	2.5	2.4	U	2.4	2.5	U	2.5
Aroclor-1260	PCB	2.7	U	2.7	3.4	J	2.5	2.4	U	2.4	2.5	U	2.5
Aldrin	PEST	0.25	U	0.25	0.24	U	0.24	0.24	U	0.24	0.23	U	0.23
Alpha-BHC	PEST	0.21	U	0.21	0.20	U	0.20	0.21	U	0.21	0.20	U	0.20
alpha-Chlordane	PEST	0.32	U	0.32	0.31	U	0.31	0.31	U	0.31	0.30	U	0.30
beta-1,2,3,4,5,6-Hexachlorocyclohexane	PEST	0.67	U	0.67	0.63	U	0.63	0.64	U	0.64	0.61	U	0.61
Delta-BHC	PEST	0.40	U	0.40	0.38	U	0.38	0.39	U	0.39	0.37	U	0.37
Dichlorodiphenyldichloroethane	PEST	0.55	U	0.55	0.52	U	0.52	0.53	U	0.53	0.51	U	0.51
Dichlorodiphenyldichloroethylene	PEST	0.24	U	0.24	0.23	U	0.23	0.23	U	0.23	0.22	U	0.22
Dichlorodiphenyltrichloroethane	PEST	0.59	U	0.59	0.56	U	0.56	0.57	U	0.57	0.55	U	0.55
Dieldrin	PEST	0.21	U	0.21	0.20	U	0.20	0.20	U	0.20	0.19	U	0.19
Endosulfan I	PEST	0.18	U	0.18	0.17	U	0.17	0.17	U	0.17	0.16	U	0.16
Endosulfan II	PEST	0.29	U	0.29	0.27	U	0.27	0.28	U	0.28	0.27	U	0.27
Endosulfan sulfate	PEST	0.28	U	0.28	0.33	JX	0.26	0.27	U	0.27	0.26	U	0.26
Endrin	PEST	0.31	U	0.31	0.29	U	0.29	0.30	U	0.30	0.28	U	0.28
Endrin aldehyde	PEST	0.17	U	0.17	0.16	U	0.16	0.17	U	0.17	0.16	U	0.16
Endrin ketone	PEST	0.49	U	0.49	0.47	U	0.47	0.47	U	0.47	0.45	U	0.45
Gamma-BHC (Lindane)	PEST	0.47	U	0.47	0.44	U	0.44	0.45	U	0.45	0.43	U	0.43
gamma-Chlordane	PEST	0.27	U	0.27	0.25	U	0.25	0.26	U	0.26	0.25	U	0.25
Heptachlor	PEST	0.21	U	0.21	0.20	U	0.20	0.21	U	0.21	0.20	U	0.20
Heptachlor epoxide	PEST	0.43	U	0.43	0.41	U	0.41	0.41	U	0.41	0.39	U	0.39
Methoxychlor	PEST	0.45	U	0.45	0.43	U	0.43	0.44	U	0.44	0.42	U	0.42
Toxaphene	PEST	16	U	16	15	U	15	15	U	15	15	U	15

Attachment 1
Originator N. K. Schiffern
Checked J. D. Skoglie
Calc. No. 0100D-CA-V0508

Sheet No. 17 of 31
Date 07/08/13
Date 07/08/13
Rev. No. 0

Attachment 1. 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	J1PWD2, FS-5			J1PWD3, FS-6		
		9/18/2012			9/18/2012		
		ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	9.6	U	9.6	9.6	U	9.6
Acenaphthylene	PAH	8.7	U	8.7	8.6	U	8.6
Anthracene	PAH	2.9	U	2.9	2.9	U	2.9
Benzo(a)anthracene	PAH	3.1	U	3.1	3.1	U	3.1
Benzo(a)pyrene	PAH	6.2	U	6.2	6.1	U	6.1
Benzo(b)fluoranthene	PAH	4.0	U	4.0	4.0	U	4.0
Benzo(ghi)perylene	PAH	6.9	U	6.9	6.9	U	6.9
Benzo(k)fluoranthene	PAH	3.8	U	3.8	3.8	U	3.8
Chrysene	PAH	4.7	U	4.7	4.6	U	4.6
Dibenz[a,h]anthracene	PAH	11	U	11	11	U	11
Fluoranthene	PAH	13	U	13	12	U	12
Fluorene	PAH	5.1	U	5.1	5.1	U	5.1
Indeno(1,2,3-cd)pyrene	PAH	12	U	12	11	U	11
Naphthalene	PAH	12	U	12	11	U	11
Phenanthrene	PAH	12	U	12	11	U	11
Pyrene	PAH	12	U	12	11	U	11
Aroclor-1016	PCB	2.6	U	2.6	2.7	U	2.7
Aroclor-1221	PCB	7.7	U	7.7	7.8	U	7.8
Aroclor-1232	PCB	1.9	U	1.9	2.0	U	2.0
Aroclor-1242	PCB	4.5	U	4.5	4.5	U	4.5
Aroclor-1248	PCB	4.5	U	4.5	4.5	U	4.5
Aroclor-1254	PCB	2.5	U	2.5	2.5	U	2.5
Aroclor-1260	PCB	2.5	U	2.5	2.5	U	2.5
Aldrin	PEST	0.25	U	0.25	0.25	U	0.25
Alpha-BHC	PEST	0.21	U	0.21	0.21	U	0.21
alpha-Chlordane	PEST	0.32	U	0.32	0.32	U	0.32
beta-1,2,3,4,5,6-Hexachlorocyclohexane	PEST	0.66	U	0.66	0.66	U	0.66
Delta-BHC	PEST	0.40	U	0.40	0.40	U	0.40
Dichlorodiphenyldichloroethane	PEST	0.54	U	0.54	0.55	U	0.55
Dichlorodiphenyldichloroethylene	PEST	0.24	U	0.24	0.24	U	0.24
Dichlorodiphenyltrichloroethane	PEST	0.59	U	0.59	0.59	U	0.59
Dieldrin	PEST	0.21	U	0.21	0.21	U	0.21
Endosulfan I	PEST	0.17	U	0.17	0.18	U	0.18
Endosulfan II	PEST	0.29	U	0.29	0.29	U	0.29
Endosulfan sulfate	PEST	0.27	U	0.27	0.28	U	0.28
Endrin	PEST	0.30	U	0.30	0.31	U	0.31
Endrin aldehyde	PEST	0.17	U	0.17	0.17	U	0.17
Endrin ketone	PEST	0.49	U	0.49	0.49	U	0.49
Gamma-BHC (Lindane)	PEST	0.46	U	0.46	0.46	U	0.46
gamma-Chlordane	PEST	0.26	U	0.26	0.27	U	0.27
Heptachlor	PEST	0.21	U	0.21	0.21	U	0.21
Heptachlor epoxide	PEST	0.42	U	0.42	0.43	U	0.43
Methoxychlor	PEST	0.45	U	0.45	0.45	U	0.45
Toxaphene	PEST	16	U	16	16	U	16

Attachment 1 Sheet No. 18 of 31
Originator N. K. Schiffern Date 07/08/13
Checked J. D. Skoglie Date 07/08/13
Calc. No. 0100D-CA-V0508 Rev. No. 0

Attachment 1. 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	J1PW83, EXC-3 [a]			J1PW93, Duplicate of J1PW83 [a]			J1PW81, EXC-1			J1PW82, EXC-2		
		9/18/2012			9/18/2012			9/18/2012			9/18/2012		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
1,2,4-Trichlorobenzene	SVOA	27	U	27	28	U	28	27	U	27	27	U	27
1,2-Dichlorobenzene	SVOA	21	U	21	22	U	22	21	U	21	21	U	21
1,3-Dichlorobenzene	SVOA	11	U	11	12	U	12	12	U	12	12	U	12
1,4-Dichlorobenzene	SVOA	13	U	13	14	U	14	13	U	13	13	U	13
2,4,5-Trichlorophenol	SVOA	9.6	U	9.6	9.9	U	9.9	9.6	U	9.6	9.7	U	9.7
2,4,6-Trichlorophenol	SVOA	9.6	U	9.6	9.9	U	9.9	9.6	U	9.6	9.7	U	9.7
2,4-Dichlorophenol	SVOA	9.6	U	9.6	9.9	U	9.9	9.6	U	9.6	9.7	U	9.7
2,4-Dimethylphenol	SVOA	63	U	63	66	U	66	64	U	64	64	U	64
2,4-Dinitrophenol	SVOA	320	UJ	320	330	UJ	330	320	UJ	320	320	UJ	320
2,4-Dinitrotoluene	SVOA	63	U	63	66	U	66	64	U	64	64	U	64
2,6-Dinitrotoluene	SVOA	27	U	27	28	U	28	27	U	27	27	U	27
2-Chloronaphthalene	SVOA	9.6	U	9.6	9.9	U	9.9	9.6	U	9.6	9.7	U	9.7
2-Chlorophenol	SVOA	20	U	20	21	U	21	20	U	20	20	U	20
2-Methylnaphthalene	SVOA	120	J	18	20	J	19	18	U	18	18	U	18
2-Methylphenol (cresol, o-)	SVOA	12	U	12	13	U	13	13	U	13	13	U	13
2-Nitroaniline	SVOA	48	U	48	50	U	50	48	U	48	49	U	49
2-Nitrophenol	SVOA	9.6	U	9.6	9.9	U	9.9	9.6	U	9.6	9.7	U	9.7
3,3'-Dichlorobenzidine	SVOA	86	UJ	86	89	UJ	89	87	UJ	87	87	UJ	87
3+4 Methylphenol (cresol, m+p)	SVOA	32	U	32	33	U	33	32	U	32	32	U	32
3-Nitroaniline	SVOA	70	U	70	72	U	72	70	U	70	71	U	71
4,6-Dinitro-2-methylphenol	SVOA	320	UJ	320	330	UJ	330	320	UJ	320	320	UJ	320
4-Bromophenylphenyl ether	SVOA	18	U	18	19	U	19	18	U	18	18	U	18
4-Chloro-3-methylphenol	SVOA	63	U	63	66	U	66	64	U	64	64	U	64
4-Chloroaniline	SVOA	78	U	78	81	U	81	79	U	79	80	U	80
4-Chlorophenylphenyl ether	SVOA	20	U	20	21	U	21	20	U	20	20	U	20
4-Nitroaniline	SVOA	69	U	69	72	U	72	70	U	70	70	U	70
4-Nitrophenol	SVOA	93	U	93	96	U	96	94	U	94	94	U	94
Acenaphthene	SVOA	390		9.9	35	J	10	9.9	U	9.9	10	U	10
Acenaphthylene	SVOA	120	J	16	17	U	17	16	U	16	17	U	17
Anthracene	SVOA	1000		16	73	J	17	16	U	16	17	U	17
Benzo(a)anthracene	SVOA	1800		19	150	J	20	19	U	19	24	J	19
Benzo(a)pyrene	SVOA	1100		19	110	J	20	19	U	19	22	J	19
Benzo(b)fluoranthene	SVOA	2100		25	200	J	26	25	U	25	40	J	25
Benzo(ghi)perylene	SVOA	620		15	62	J	16	15	U	15	16	U	16
Benzo(k)fluoranthene	SVOA	38	U	38	40	U	40	39	U	39	39	U	39
Bis(2-chloro-1-methylethyl)ether	SVOA	22	U	22	23	U	23	22	U	22	22	U	22
Bis(2-Chloroethoxy)methane	SVOA	22	U	22	23	U	23	22	U	22	22	U	22
Bis(2-chloroethyl) ether	SVOA	16	U	16	16	U	16	16	U	16	16	U	16
Bis(2-ethylhexyl) phthalate	SVOA	44	U	44	46	U	46	44	U	44	45	U	45
Butylbenzylphthalate	SVOA	41	U	41	43	U	43	41	U	41	42	U	42
Carbazole	SVOA	570		34	42	J	36	35	U	35	35	U	35
Chrysene	SVOA	1800		26	170	J	27	26	U	26	26	U	26
Dibenz[a,h]anthracene	SVOA	160	J	18	19	J	19	18	U	18	18	U	18
Dibenzofuran	SVOA	340		19	53	J	20	19	U	19	19	U	19
Diethyl phthalate	SVOA	25	U	25	26	U	26	25	U	25	25	U	25
Dimethyl phthalate	SVOA	22	U	22	23	U	23	22	U	22	22	U	22
Di-n-butylphthalate	SVOA	28	U	28	29	U	29	28	U	28	28	U	28
Di-n-octylphthalate	SVOA	14	U	14	14	U	14	14	U	14	14	U	14
Fluoranthene	SVOA	3700		34	340		36	35	U	35	35	U	35
Fluorene	SVOA	580		17	64	J	18	17	U	17	17	U	17
Hexachlorobenzene	SVOA	28	U	28	29	U	29	28	U	28	28	U	28
Hexachlorobutadiene	SVOA	9.6	U	9.6	9.9	U	9.9	9.6	U	9.6	9.7	U	9.7
Hexachlorocyclopentadiene	SVOA	48	U	48	50	U	50	48	U	48	49	U	49
Hexachloroethane	SVOA	20	U	20	21	U	21	21	U	21	21	U	21
Indeno(1,2,3-cd)pyrene	SVOA	550		21	47	J	22	21	U	21	21	U	21
Isophorone	SVOA	16	U	16	17	U	17	16	U	16	17	U	17
Naphthalene	SVOA	170	J	30	31	U	31	30	U	30	30	U	30
Nitrobenzene	SVOA	21	U	21	22	U	22	21	U	21	21	U	21
N-Nitroso-di-n-dipropylamine	SVOA	30	U	30	31	U	31	30	U	30	30	U	30
N-Nitrosodiphenylamine	SVOA	20	U	20	21	U	21	20	U	20	20	U	20
Pentachlorophenol	SVOA	320	U	320	330	U	330	320	U	320	320	U	320
Phenanthrene	SVOA	3900		16	360		17	16	U	16	17	U	17
Phenol	SVOA	17	U	17	18	U	18	17	U	17	17	U	17
Pyrene	SVOA	2900		12	270	J	12	12	U	12	38	J	12

Attachment	1	Sheet No.	19 of 31
Originator	N. K. Schiffern	Date	07/08/13
Checked	J. D. Skoglie	Date	07/08/13
Calc. No.	0100D-CA-V0508	Rev. No.	0

Attachment 1. 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	J1RJ77, EXC-4			J1PW85, EXC-5			J1PW86, EXC-6			J1PW87, EXC-7		
		3/15/2013			9/18/2012			9/18/2012			9/18/2012		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
1,2,4-Trichlorobenzene	SVOA	28	U	28	27	U	27	28	U	28	28	U	28
1,2-Dichlorobenzene	SVOA	22	U	22	21	U	21	22	U	22	22	U	22
1,3-Dichlorobenzene	SVOA	12	U	12	12	U	12	12	U	12	12	U	12
1,4-Dichlorobenzene	SVOA	14	U	14	13	U	13	13	U	13	13	U	13
2,4,5-Trichlorophenol	SVOA	10	U	10	9.7	U	9.7	9.9	U	9.9	9.9	U	9.9
2,4,6-Trichlorophenol	SVOA	10	U	10	9.7	U	9.7	9.9	U	9.9	9.9	U	9.9
2,4-Dichlorophenol	SVOA	10	U	10	9.7	U	9.7	9.9	U	9.9	9.9	U	9.9
2,4-Dimethylphenol	SVOA	67	U	67	64	U	64	65	U	65	65	U	65
2,4-Dinitrophenol	SVOA	340	U	340	320	UJ	320	330	UXJ	330	330	UJ	330
2,4-Dinitrotoluene	SVOA	67	U	67	64	U	64	65	U	65	65	U	65
2,6-Dinitrotoluene	SVOA	28	U	28	27	U	27	28	U	28	28	U	28
2-Chloronaphthalene	SVOA	10	U	10	9.7	U	9.7	9.9	U	9.9	9.9	U	9.9
2-Chlorophenol	SVOA	21	U	21	20	U	20	21	U	21	21	U	21
2-Methylnaphthalene	SVOA	19	U	19	18	U	18	19	U	19	19	U	19
2-Methylphenol (cresol, o-)	SVOA	13	U	13	13	U	13	13	U	13	13	U	13
2-Nitroaniline	SVOA	51	U	51	48	U	48	49	U	49	49	U	49
2-Nitrophenol	SVOA	10	U	10	9.7	U	9.7	9.9	U	9.9	9.9	U	9.9
3,3'-Dichlorobenzidine	SVOA	91	U	91	87	UJ	87	89	UJ	89	89	UJ	89
3+4 Methylphenol (cresol, m+p)	SVOA	34	U	34	32	U	32	33	U	33	33	U	33
3-Nitroaniline	SVOA	74	U	74	71	U	71	72	U	72	72	U	72
4,6-Dinitro-2-methylphenol	SVOA	340	U	340	320	UJ	320	330	UXJ	330	330	UJ	330
4-Bromophenylphenyl ether	SVOA	19	U	19	18	U	18	19	U	19	19	U	19
4-Chloro-3-methylphenol	SVOA	67	U	67	64	U	64	65	U	65	65	U	65
4-Chloroaniline	SVOA	83	U	83	79	U	79	81	U	81	81	U	81
4-Chlorophenylphenyl ether	SVOA	21	U	21	20	U	20	21	U	21	21	U	21
4-Nitroaniline	SVOA	74	U	74	70	U	70	71	U	71	71	U	71
4-Nitrophenol	SVOA	99	U	99	94	U	94	96	U	96	96	U	96
Acenaphthene	SVOA	10	U	10	10	U	10	10	U	10	10	U	10
Acenaphthylene	SVOA	17	U	17	16	U	16	17	U	17	17	U	17
Anthracene	SVOA	17	U	17	16	U	16	17	U	17	17	U	17
Benzo(a)anthracene	SVOA	42	J	20	49	J	19	20	U	20	20	U	20
Benzo(a)pyrene	SVOA	36	J	20	47	J	19	20	U	20	20	U	20
Benzo(b)fluoranthene	SVOA	68	JX	27	79	J	25	26	U	26	26	U	26
Benzo(ghi)perylene	SVOA	20	J	16	32	J	15	16	U	16	16	U	16
Benzo(k)fluoranthene	SVOA	41	UX	41	39	U	39	39	U	39	39	U	39
Bis(2-chloro-1-methylethyl)ether	SVOA	23	U	23	22	U	22	23	U	23	23	U	23
Bis(2-Chloroethoxy)methane	SVOA	23	U	23	22	U	22	23	U	23	23	U	23
Bis(2-chloroethyl) ether	SVOA	17	U	17	16	U	16	16	U	16	16	U	16
Bis(2-ethylhexyl) phthalate	SVOA	47	U	47	45	U	45	45	U	45	45	U	45
Butylbenzylphthalate	SVOA	44	U	44	42	U	42	42	U	42	42	U	42
Carbazole	SVOA	37	U	37	35	U	35	35	U	35	35	U	35
Chrysene	SVOA	50	J	27	42	J	26	27	U	27	27	U	27
Dibenz[a,h]anthracene	SVOA	19	U	19	18	U	18	19	U	19	19	U	19
Dibenzofuran	SVOA	20	U	20	19	U	19	20	U	20	20	U	20
Diethyl phthalate	SVOA	26	U	26	25	U	25	26	U	26	26	U	26
Dimethyl phthalate	SVOA	23	U	23	22	U	22	23	U	23	23	U	23
Di-n-butylphthalate	SVOA	29	U	29	28	U	28	29	U	29	29	U	29
Di-n-octylphthalate	SVOA	15	U	15	14	U	14	14	U	14	14	U	14
Fluoranthene	SVOA	81	J	37	79	J	35	35	U	35	35	U	35
Fluorene	SVOA	18	U	18	17	U	17	18	U	18	18	U	18
Hexachlorobenzene	SVOA	29	U	29	28	U	28	29	U	29	29	U	29
Hexachlorobutadiene	SVOA	10	U	10	9.7	U	9.7	9.9	U	9.9	9.9	U	9.9
Hexachlorocyclopentadiene	SVOA	51	U	51	48	U	48	49	U	49	49	U	49
Hexachloroethane	SVOA	22	U	22	21	U	21	21	U	21	21	U	21
Indeno(1,2,3-cd)pyrene	SVOA	22	U	22	24	J	21	22	U	22	22	U	22
Isophorone	SVOA	17	U	17	16	U	16	17	U	17	17	U	17
Naphthalene	SVOA	32	U	32	30	U	30	31	U	31	31	U	31
Nitrobenzene	SVOA	22	U	22	21	U	21	22	U	22	22	U	22
N-Nitroso-di-n-dipropylamine	SVOA	32	U	32	30	U	30	31	U	31	31	U	31
N-Nitrosodiphenylamine	SVOA	21	U	21	20	U	20	21	U	21	21	U	21
Pentachlorophenol	SVOA	340	U	340	320	U	320	330	U	330	330	U	330
Phenanthrene	SVOA	39	J	17	39	J	16	17	U	17	17	U	17
Phenol	SVOA	18	U	18	17	U	17	18	U	18	18	U	18
Pyrene	SVOA	76	J	12	73	J	12	12	U	12	12	U	12

Attachment	1	Sheet No.	20 of 31
Originator	N. K. Schiffern	Date	07/08/13
Checked	J. D. Skoglie	Date	07/08/13
Calc. No.	0100D-CA-V0508	Rev. No.	0

Attachment 1. 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	J1PW88, EXC-8			J1PW89, EXC-9			J1PW90, EXC-10			J1PW91, EXC-11		
		9/18/2012			9/18/2012			9/18/2012			9/18/2012		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
1,2,4-Trichlorobenzene	SVOA	28	U	28	27	U	27	26	U	26	27	U	27
1,2-Dichlorobenzene	SVOA	22	U	22	21	U	21	21	U	21	22	U	22
1,3-Dichlorobenzene	SVOA	12	U	12	12	U	12	11	U	11	12	U	12
1,4-Dichlorobenzene	SVOA	14	U	14	13	U	13	13	U	13	13	U	13
2,4,5-Trichlorophenol	SVOA	10	U	10	9.7	U	9.7	9.4	U	9.4	9.8	U	9.8
2,4,6-Trichlorophenol	SVOA	10	U	10	9.7	U	9.7	9.4	U	9.4	9.8	U	9.8
2,4-Dichlorophenol	SVOA	10	U	10	9.7	U	9.7	9.4	U	9.4	9.8	U	9.8
2,4-Dimethylphenol	SVOA	67	U	67	64	U	64	62	U	62	65	U	65
2,4-Dinitrophenol	SVOA	340	UJ	340	320	UJ	320	310	UJ	310	330	UJ	330
2,4-Dinitrotoluene	SVOA	67	U	67	64	U	64	62	U	62	65	U	65
2,6-Dinitrotoluene	SVOA	28	U	28	27	U	27	26	U	26	27	U	27
2-Chloronaphthalene	SVOA	10	U	10	9.7	U	9.7	9.4	U	9.4	9.8	U	9.8
2-Chlorophenol	SVOA	21	U	21	20	U	20	20	U	20	21	U	21
2-Methylnaphthalene	SVOA	19	U	19	18	U	18	18	U	18	19	U	19
2-Methylphenol (cresol, o-)	SVOA	13	U	13	13	U	13	12	U	12	13	U	13
2-Nitroaniline	SVOA	51	U	51	48	U	48	47	U	47	49	U	49
2-Nitrophenol	SVOA	10	U	10	9.7	U	9.7	9.4	U	9.4	9.8	U	9.8
3,3'-Dichlorobenzidine	SVOA	91	UJ	91	87	UJ	87	85	UJ	85	88	UJ	88
3+4 Methylphenol (cresol, m+p)	SVOA	33	U	33	32	U	32	31	U	31	32	U	32
3-Nitroaniline	SVOA	74	U	74	71	U	71	69	U	69	71	U	71
4,6-Dinitro-2-methylphenol	SVOA	330	UJ	330	320	UJ	320	310	UJ	310	320	UJ	320
4-Bromophenylphenyl ether	SVOA	19	U	19	18	U	18	18	U	18	19	U	19
4-Chloro-3-methylphenol	SVOA	67	U	67	64	U	64	62	U	62	65	U	65
4-Chloroaniline	SVOA	83	U	83	79	U	79	77	U	77	80	U	80
4-Chlorophenylphenyl ether	SVOA	21	U	21	20	U	20	20	U	20	21	U	21
4-Nitroaniline	SVOA	74	U	74	70	U	70	68	U	68	71	U	71
4-Nitrophenol	SVOA	98	U	98	94	U	94	91	U	91	95	U	95
Acenaphthene	SVOA	10	U	10	10	U	10	9.7	U	9.7	10	U	10
Acenaphthylene	SVOA	17	U	17	16	U	16	16	U	16	17	U	17
Anthracene	SVOA	17	U	17	16	U	16	16	U	16	17	U	17
Benzo(a)anthracene	SVOA	20	U	20	19	U	19	19	U	19	20	U	20
Benzo(a)pyrene	SVOA	20	U	20	19	U	19	19	U	19	20	U	20
Benzo(b)fluoranthene	SVOA	27	U	27	25	U	25	25	U	25	26	U	26
Benzo(ghi)perylene	SVOA	16	U	16	15	U	15	15	U	15	16	U	16
Benzo(k)fluoranthene	SVOA	41	U	41	39	U	39	38	U	38	39	U	39
Bis(2-chloro-1-methylethyl)ether	SVOA	23	U	23	22	U	22	22	U	22	22	U	22
Bis(2-Chloroethoxy)methane	SVOA	23	U	23	22	U	22	22	U	22	22	U	22
Bis(2-chloroethyl) ether	SVOA	17	U	17	16	U	16	16	U	16	16	U	16
Bis(2-ethylhexyl) phthalate	SVOA	47	U	47	44	U	44	43	U	43	45	U	45
Butylbenzylphthalate	SVOA	44	U	44	42	U	42	41	U	41	42	U	42
Carbazole	SVOA	37	U	37	35	U	35	34	U	34	35	U	35
Chrysene	SVOA	27	U	27	26	U	26	25	U	25	26	U	26
Dibenz[a,h]anthracene	SVOA	19	U	19	18	U	18	18	U	18	19	U	19
Dibenzofuran	SVOA	20	U	20	19	U	19	19	U	19	20	U	20
Diethyl phthalate	SVOA	26	U	26	25	U	25	25	U	25	25	U	25
Dimethyl phthalate	SVOA	23	U	23	22	U	22	22	U	22	22	U	22
Di-n-butylphthalate	SVOA	29	U	29	28	U	28	27	U	27	28	U	28
Di-n-octylphthalate	SVOA	15	U	15	14	U	14	14	U	14	14	U	14
Fluoranthene	SVOA	37	U	37	35	U	35	34	U	34	35	U	35
Fluorene	SVOA	18	U	18	17	U	17	17	U	17	18	U	18
Hexachlorobenzene	SVOA	29	U	29	28	U	28	27	U	27	28	U	28
Hexachlorobutadiene	SVOA	10	U	10	9.7	U	9.7	9.4	U	9.4	9.8	U	9.8
Hexachlorocyclopentadiene	SVOA	51	U	51	48	U	48	47	U	47	49	U	49
Hexachloroethane	SVOA	22	U	22	21	U	21	20	U	20	21	U	21
Indeno(1,2,3-cd)pyrene	SVOA	22	U	22	21	U	21	21	U	21	22	U	22
Isophorone	SVOA	17	U	17	16	U	16	16	U	16	17	U	17
Naphthalene	SVOA	31	U	31	30	U	30	29	U	29	30	U	30
Nitrobenzene	SVOA	22	U	22	21	U	21	21	U	21	22	U	22
N-Nitroso-di-n-dipropylamine	SVOA	31	U	31	30	U	30	29	U	29	30	U	30
N-Nitrosodiphenylamine	SVOA	21	U	21	20	U	20	20	U	20	21	U	21
Pentachlorophenol	SVOA	330	U	330	320	U	320	310	U	310	320	U	320
Phenanthrene	SVOA	17	U	17	16	U	16	16	U	16	17	U	17
Phenol	SVOA	18	U	18	17	U	17	17	U	17	18	U	18
Pyrene	SVOA	12	U	12	12	U	12	11	U	11	12	U	12

Attachment	1	Sheet No.	21 of 31
Originator	N. K. Schiffern	Date	07/08/13
Checked	J. D. Skoglie	Date	07/08/13
Calc. No.	0100D-CA-V0508	Rev. No.	0

Attachment 1. 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	J1PW92, EXC-12			J1PWF8, Split of J1PW83			J1R645, SPA-5			J1R653, Duplicate of J1R645		
		9/18/2012			9/18/2012			4/8/2013			4/8/2013		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
1,2,4-Trichlorobenzene	SVOA	27	U	27	648	UD	648	29	U	29	29	U	29
1,2-Dichlorobenzene	SVOA	22	U	22	648	UD	648	23	U	23	22	U	22
1,3-Dichlorobenzene	SVOA	12	U	12	648	UD	648	12	U	12	12	U	12
1,4-Dichlorobenzene	SVOA	13	U	13	648	UD	648	14	U	14	14	U	14
2,4,5-Trichlorophenol	SVOA	9.8	U	9.8	648	UD	648	10	U	10	10	U	10
2,4,6-Trichlorophenol	SVOA	9.8	U	9.8	648	UD	648	10	U	10	10	U	10
2,4-Dichlorophenol	SVOA	9.8	U	9.8	648	UD	648	10	U	10	10	U	10
2,4-Dimethylphenol	SVOA	65	U	65	648	UD	648	68	U	68	67	U	67
2,4-Dinitrophenol	SVOA	330	UJ	330	3240	UD	3240	340	U	340	340	U	340
2,4-Dinitrotoluene	SVOA	65	U	65	648	UD	648	68	U	68	67	U	67
2,6-Dinitrotoluene	SVOA	27	U	27	648	UD	648	29	U	29	29	U	29
2-Chloronaphthalene	SVOA	9.8	U	9.8	648	UD	648	10	U	10	10	U	10
2-Chlorophenol	SVOA	21	U	21	648	UD	648	22	U	22	21	U	21
2-Methylnaphthalene	SVOA	19	U	19	648	UD	648	19	U	19	19	U	19
2-Methylphenol (cresol, o-)	SVOA	13	U	13	648	UD	648	13	U	13	13	U	13
2-Nitroaniline	SVOA	49	U	49	3240	UD	3240	51	U	51	51	U	51
2-Nitrophenol	SVOA	9.8	U	9.8	648	UD	648	10	U	10	10	U	10
3,3'-Dichlorobenzidine	SVOA	88	UJ	88	1300	UD	1300	92	U	92	92	U	92
3+4 Methylphenol (cresol, m+p)	SVOA	32	U	32	648	UD	648	34	U	34	34	U	34
3-Nitroaniline	SVOA	71	U	71	3240	UD	3240	75	U	75	75	U	75
4,6-Dinitro-2-methylphenol	SVOA	320	UJ	320	648	UD	648	340	U	340	340	U	340
4-Bromophenylphenyl ether	SVOA	19	U	19	648	UD	648	19	U	19	19	U	19
4-Chloro-3-methylphenol	SVOA	65	U	65	648	UD	648	68	U	68	67	U	67
4-Chloroaniline	SVOA	80	U	80	648	UD	648	84	U	84	84	U	84
4-Chlorophenylphenyl ether	SVOA	21	U	21	648	UD	648	22	U	22	21	U	21
4-Nitroaniline	SVOA	71	U	71	3240	UD	3240	74	U	74	74	U	74
4-Nitrophenol	SVOA	95	U	95	3240	UD	3240	99	U	99	99	U	99
Acenaphthene	SVOA	10	U	10	648	UD	648	11	U	11	11	U	11
Acenaphthylene	SVOA	17	U	17	648	UD	648	17	U	17	17	U	17
Anthracene	SVOA	17	U	17	107	J D	648	17	U	17	17	U	17
Benzo(a)anthracene	SVOA	20	U	20	312	D J	648	21	U	21	20	U	20
Benzo(a)pyrene	SVOA	20	U	20	182	J D	648	21	U	21	20	U	20
Benzo(b)fluoranthene	SVOA	26	U	26	241	J D	648	27	U	27	27	U	27
Benzo(ghi)perylene	SVOA	16	U	16	148	J D	648	16	U	16	16	U	16
Benzo(k)fluoranthene	SVOA	39	U	39	232	J D	648	41	U	41	41	U	41
Bis(2-chloro-1-methylethyl)ether	SVOA	22	U	22	648	UD	648	24	U	24	24	U	24
Bis(2-Chloroethoxy)methane	SVOA	22	U	22	648	UD	648	24	U	24	24	U	24
Bis(2-chloroethyl) ether	SVOA	16	U	16	648	UD	648	17	U	17	17	U	17
Bis(2-ethylhexyl) phthalate	SVOA	45	U	45	648	UD	648	47	U	47	47	U	47
Butylbenzylphthalate	SVOA	42	U	42	648	UD	648	44	U	44	44	U	44
Carbazole	SVOA	35	U	35	648	UD	648	37	U	37	37	U	37
Chrysene	SVOA	26	U	26	402	J D	648	28	U	28	28	U	28
Dibenz[a,h]anthracene	SVOA	19	U	19	648	UD	648	19	U	19	19	U	19
Dibenzofuran	SVOA	20	U	20	121	J D	648	21	U	21	20	U	20
Diethyl phthalate	SVOA	25	U	25	648	UD	648	27	U	27	27	U	27
Dimethyl phthalate	SVOA	22	U	22	648	UD	648	24	U	24	24	U	24
Di-n-butylphthalate	SVOA	28	U	28	648	UD	648	30	U	30	30	U	30
Di-n-octylphthalate	SVOA	14	U	14	648	UD	648	15	U	15	15	U	15
Fluoranthene	SVOA	35	U	35	737	D	648	37	U	37	37	U	37
Fluorene	SVOA	18	U	18	142	J D	648	18	U	18	18	U	18
Hexachlorobenzene	SVOA	28	U	28	648	UD	648	30	U	30	30	U	30
Hexachlorobutadiene	SVOA	9.8	U	9.8	648	UD	648	10	U	10	10	U	10
Hexachlorocyclopentadiene	SVOA	49	U	49	648	UD	648	51	U	51	51	U	51
Hexachloroethane	SVOA	21	U	21	648	UD	648	22	U	22	22	U	22
Indeno(1,2,3-cd)pyrene	SVOA	22	U	22	120	J D	648	23	U	23	22	U	22
Isophorone	SVOA	17	U	17	648	UD	648	17	U	17	17	U	17
Naphthalene	SVOA	30	U	30	648	UD	648	32	U	32	32	U	32
Nitrobenzene	SVOA	22	U	22	648	UD	648	23	U	23	22	U	22
N-Nitroso-di-n-dipropylamine	SVOA	30	U	30	648	UD	648	32	U	32	32	U	32
N-Nitrosodiphenylamine	SVOA	21	U	21	648	UD	648	22	U	22	21	U	21
Pentachlorophenol	SVOA	320	U	320	3240	UD	3240	340	U	340	340	U	340
Phenanthrene	SVOA	17	U	17	784	D	648	17	U	17	17	U	17
Phenol	SVOA	18	U	18	648	UD	648	18	U	18	18	U	18
Pyrene	SVOA	12	J	12	664	D	648	12	U	12	12	U	12

Attachment	1	Sheet No.	22 of 31
Originator	N. K. Schiffern	Date	07/08/13
Checked	J. D. Skoglie	Date	07/08/13
Calc. No.	0100D-CA-V0508	Rev. No.	0

Attachment 1. 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	J1R641, SPA-1			J1R642, SPA-2			J1R643, SPA-3			J1R644, SPA-4		
		4/8/2013 14:35			4/8/2013 14:20			4/8/2013 14:30			4/8/2013 14:40		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
1,2,4-Trichlorobenzene	SVOA	28	U	28	28	U	28	29	U	29	28	U	28
1,2-Dichlorobenzene	SVOA	22	U	22	22	U	22	23	U	23	22	U	22
1,3-Dichlorobenzene	SVOA	12	U	12	12	U	12	13	U	13	12	U	12
1,4-Dichlorobenzene	SVOA	14	U	14	14	U	14	14	U	14	14	U	14
2,4,5-Trichlorophenol	SVOA	10	U	10	10	U	10	10	U	10	10	U	10
2,4,6-Trichlorophenol	SVOA	10	U	10	10	U	10	10	U	10	10	U	10
2,4-Dichlorophenol	SVOA	10	U	10	10	U	10	10	U	10	10	U	10
2,4-Dimethylphenol	SVOA	66	U	66	67	U	67	69	U	69	66	U	66
2,4-Dinitrophenol	SVOA	330	U	330	340	U	340	350	U	350	330	U	330
2,4-Dinitrotoluene	SVOA	66	U	66	67	U	67	69	U	69	66	U	66
2,6-Dinitrotoluene	SVOA	28	U	28	28	U	28	29	U	29	28	U	28
2-Chloronaphthalene	SVOA	10	U	10	10	U	10	10	U	10	10	U	10
2-Chlorophenol	SVOA	21	U	21	21	U	21	22	U	22	21	U	21
2-Methylnaphthalene	SVOA	19	U	19	19	U	19	20	U	20	19	U	19
2-Methylphenol (cresol, o-)	SVOA	13	U	13	13	U	13	14	U	14	13	U	13
2-Nitroaniline	SVOA	50	U	50	51	U	51	52	U	52	50	U	50
2-Nitrophenol	SVOA	10	U	10	10	U	10	10	U	10	10	U	10
3,3'-Dichlorobenzidine	SVOA	90	U	90	91	U	91	94	U	94	90	U	90
3+4 Methylphenol (cresol, m+p)	SVOA	33	U	33	34	U	34	34	U	34	33	U	33
3-Nitroaniline	SVOA	73	U	73	74	U	74	76	U	76	73	U	73
4,6-Dinitro-2-methylphenol	SVOA	330	U	330	340	U	340	340	U	340	330	U	330
4-Bromophenylphenyl ether	SVOA	19	U	19	19	U	19	20	U	20	19	U	19
4-Chloro-3-methylphenol	SVOA	66	U	66	67	U	67	69	U	69	66	U	66
4-Chloroaniline	SVOA	82	U	82	83	U	83	86	U	86	82	U	82
4-Chlorophenylphenyl ether	SVOA	21	U	21	21	U	21	22	U	22	21	U	21
4-Nitroaniline	SVOA	73	U	73	74	U	74	76	U	76	72	U	72
4-Nitrophenol	SVOA	98	U	98	98	U	98	100	U	100	97	U	97
Acenaphthene	SVOA	10	U	10	10	U	10	11	U	11	10	U	10
Acenaphthylene	SVOA	17	U	17	17	U	17	18	U	18	17	U	17
Anthracene	SVOA	17	U	17	17	U	17	18	U	18	17	U	17
Benzo(a)anthracene	SVOA	20	U	20	36	J	20	25	J	21	20	U	20
Benzo(a)pyrene	SVOA	20	U	20	31	J	20	21	J	21	20	U	20
Benzo(b)fluoranthene	SVOA	26	U	26	62	JX	27	42	JX	27	26	U	26
Benzo(ghi)perylene	SVOA	16	U	16	23	J	16	17	U	17	16	U	16
Benzo(k)fluoranthene	SVOA	40	U	40	41	UX	41	42	UX	42	40	U	40
Bis(2-chloro-1-methylethyl)ether	SVOA	23	U	23	23	U	23	24	U	24	23	U	23
Bis(2-Chloroethoxy)methane	SVOA	23	U	23	23	U	23	24	U	24	23	U	23
Bis(2-chloroethyl) ether	SVOA	17	U	17	17	U	17	17	U	17	17	U	17
Bis(2-ethylhexyl) phthalate	SVOA	46	U	46	47	U	47	48	U	48	46	U	46
Butylbenzylphthalate	SVOA	43	U	43	44	U	44	45	U	45	43	U	43
Carbazole	SVOA	36	U	36	37	U	37	38	U	38	36	U	36
Chrysene	SVOA	27	U	27	38	J	27	28	U	28	27	U	27
Dibenz[a,h]anthracene	SVOA	19	U	19	19	U	19	20	U	20	19	U	19
Dibenzofuran	SVOA	20	U	20	20	U	20	21	U	21	20	U	20
Diethyl phthalate	SVOA	26	U	26	26	U	26	27	U	27	26	U	26
Dimethyl phthalate	SVOA	23	U	23	23	U	23	24	U	24	23	U	23
Di-n-butylphthalate	SVOA	29	U	29	29	U	29	30	U	30	29	U	29
Di-n-octylphthalate	SVOA	14	U	14	15	U	15	15	U	15	14	U	14
Fluoranthene	SVOA	36	U	36	61	J	37	44	J	38	36	U	36
Fluorene	SVOA	18	U	18	18	U	18	19	U	19	18	U	18
Hexachlorobenzene	SVOA	29	U	29	29	U	29	30	U	30	29	U	29
Hexachlorobutadiene	SVOA	10	U	10	10	U	10	10	U	10	10	U	10
Hexachlorocyclopentadiene	SVOA	50	U	50	51	U	51	52	U	52	50	U	50
Hexachloroethane	SVOA	21	U	21	22	U	22	22	U	22	21	U	21
Indeno(1,2,3-cd)pyrene	SVOA	22	U	22	22	U	22	23	U	23	22	U	22
Isophorone	SVOA	17	U	17	17	U	17	18	U	18	17	U	17
Naphthalene	SVOA	31	U	31	31	U	31	32	U	32	31	U	31
Nitrobenzene	SVOA	22	U	22	22	U	22	23	U	23	22	U	22
N-Nitroso-di-n-dipropylamine	SVOA	31	U	31	31	U	31	32	U	32	31	U	31
N-Nitrosodiphenylamine	SVOA	21	U	21	21	U	21	22	U	22	21	U	21
Pentachlorophenol	SVOA	330	U	330	340	U	340	340	U	340	330	U	330
Phenanthrene	SVOA	17	U	17	22	J	17	22	J	18	17	U	17
Phenol	SVOA	18	U	18	18	U	18	19	U	19	18	U	18
Pyrene	SVOA	12	U	12	59	J	12	39	J	13	12	U	12

Attachment	1	Sheet No.	23 of 31
Originator	N. K. Schiffern	Date	07/08/13
Checked	J. D. Skoglie	Date	07/08/13
Calc. No.	0100D-CA-V0508	Rev. No.	0

Attachment 1. 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	J1RKM6, SPA-10			J1RKM7, SPA-11			J1RKM5, SPA-12			J1R670, Split of J1R645		
		4/29/2013			4/29/2013			4/29/2013			4/8/2013		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
1,2,4-Trichlorobenzene	SVOA	28	U	28	28	U	28	27	U	27	35	U	35
1,2-Dichlorobenzene	SVOA	22	U	22	22	U	22	21	U	21	35	U	35
1,3-Dichlorobenzene	SVOA	12	U	12	12	U	12	12	U	12	35	U	35
1,4-Dichlorobenzene	SVOA	14	U	14	13	U	13	13	U	13	35	U	35
1,4-Dioxane	SVOA										35	U	35
2,4,5-Trichlorophenol	SVOA	10	U	10	9.8	U	9.8	9.7	U	9.7	35	U	35
2,4,6-Trichlorophenol	SVOA	10	U	10	9.8	U	9.8	9.7	U	9.7	35	U	35
2,4-Dichlorophenol	SVOA	10	U	10	9.8	U	9.8	9.7	U	9.7	35	U	35
2,4-Dimethylphenol	SVOA	66	U	66	65	U	65	64	U	64	35	U	35
2,4-Dinitrophenol	SVOA	330	U	330	330	U	330	320	UX	320	340	U	340
2,4-Dinitrotoluene	SVOA	66	U	66	65	U	65	64	U	64	35	U	35
2,6-Dinitrotoluene	SVOA	28	U	28	28	U	28	27	U	27	35	U	35
2-Chloronaphthalene	SVOA	10	U	10	9.8	U	9.8	9.7	U	9.7	35	U	35
2-Chlorophenol	SVOA	21	U	21	21	U	21	20	U	20	35	U	35
2-Methylnaphthalene	SVOA	19	U	19	19	U	19	18	U	18	35	U	35
2-Methylphenol (cresol, o-)	SVOA	13	U	13	13	U	13	13	U	13	35	U	35
2-Nitroaniline	SVOA	50	U	50	49	U	49	49	U	49	35	U	35
2-Nitrophenol	SVOA	10	U	10	9.8	U	9.8	9.7	U	9.7	35	U	35
3,3'-Dichlorobenzidine	SVOA	90	U	90	89	U	89	88	U	88	340	U	340
3+4 Methylphenol (cresol, m+p)	SVOA	33	U	33	33	U	33	32	U	32	69	U	69
3-Nitroaniline	SVOA	73	U	73	72	U	72	71	U	71	35	U	35
4,6-Dinitro-2-methylphenol	SVOA	330	U	330	330	U	330	320	U	320	340	U	340
4-Bromophenylphenyl ether	SVOA	19	U	19	19	U	19	18	U	18	35	U	35
4-Chloro-3-methylphenol	SVOA	66	U	66	65	U	65	64	U	64	35	U	35
4-Chloroaniline	SVOA	82	U	82	81	U	81	80	U	80	35	U	35
4-Chlorophenylphenyl ether	SVOA	21	U	21	21	U	21	20	U	20	35	U	35
4-Nitroaniline	SVOA	73	U	73	71	U	71	71	U	71	340	U	340
4-Nitrophenol	SVOA	97	U	97	96	U	96	94	U	94	340	U	340
Acenaphthene	SVOA	10	U	10	10	U	10	10	U	10	35	U	35
Acenaphthylene	SVOA	17	U	17	17	U	17	17	U	17	35	U	35
Aniline	SVOA										62	U	62
Anthracene	SVOA	17	U	17	17	U	17	17	U	17	35	U	35
Benzo(a)anthracene	SVOA	20	U	20	20	U	20	19	U	19	35	U	35
Benzo(a)pyrene	SVOA	20	U	20	20	U	20	19	U	19	35	U	35
Benzo(b)fluoranthene	SVOA	26	U	26	26	U	26	25	U	25	35	U	35
Benzo(ghi)perylene	SVOA	16	U	16	16	U	16	16	U	16	35	U	35
Benzo(k)fluoranthene	SVOA	40	U	40	39	U	39	39	U	39	35	U	35
Benzyl alcohol	SVOA										54	U	54
Bis(2-chloro-1-methylethyl)ether	SVOA	23	U	23	23	U	23	22	U	22	35	U	35
Bis(2-Chloroethoxy)methane	SVOA	23	U	23	23	U	23	22	U	22	35	U	35
Bis(2-chloroethyl) ether	SVOA	17	U	17	16	U	16	16	U	16	35	U	35
Bis(2-ethylhexyl) phthalate	SVOA	46	U	46	45	U	45	45	U	45	47	U	47
Butylbenzylphthalate	SVOA	43	U	43	42	U	42	42	U	42	35	U	35
Carbazole	SVOA	36	U	36	35	U	35	35	U	35	35	U	35
Chrysene	SVOA	27	U	27	27	U	27	26	U	26	35	U	35
Dibenz[a,h]anthracene	SVOA	19	U	19	19	U	19	18	U	18	35	U	35
Dibenzofuran	SVOA	20	U	20	20	U	20	19	U	19	35	U	35
Diethyl phthalate	SVOA										35	U	35
Diethylphthalate	SVOA	26	U	26	26	U	26	25	U	25			
Dimethyl phthalate	SVOA	23	U	23	23	U	23	22	U	22	35	U	35
Di-n-butylphthalate	SVOA	29	U	29	29	U	29	28	U	28	35	U	35
Di-n-octylphthalate	SVOA	14	U	14	14	U	14	14	U	14	35	U	35
Fluoranthene	SVOA	36	U	36	35	U	35	35	U	35	35	U	35
Fluorene	SVOA	18	U	18	18	U	18	18	U	18	35	U	35
Hexachlorobenzene	SVOA	29	U	29	29	U	29	28	U	28	35	U	35
Hexachlorobutadiene	SVOA	10	U	10	9.8	U	9.8	9.7	U	9.7	35	U	35
Hexachlorocyclopentadiene	SVOA	50	U	50	49	U	49	49	U	49	340	U	340
Hexachloroethane	SVOA	21	U	21	21	U	21	21	U	21	35	U	35
Indeno(1,2,3-cd)pyrene	SVOA	22	U	22	22	U	22	21	U	21	35	U	35
Isophorone	SVOA	17	U	17	17	U	17	17	U	17	35	U	35
Naphthalene	SVOA	31	U	31	31	U	31	30	U	30	35	U	35
Nitrobenzene	SVOA	22	U	22	22	U	22	21	U	21	35	U	35
N-Nitroso-di-n-dipropylamine	SVOA	31	U	31	31	U	31	30	U	30	35	U	35
N-Nitrosodiphenylamine	SVOA	21	U	21	21	U	21	20	U	20	35	U	35
Pentachlorophenol	SVOA	330	U	330	330	U	330	320	U	320	340	U	340
Phenanthrene	SVOA	17	U	17	17	U	17	17	U	17	35	U	35
Phenol	SVOA	18	U	18	18	U	18	18	U	18	35	U	35
Pyrene	SVOA	12	U	12	12	U	12	12	U	12	35	U	35
Pyridine	SVOA										69	U	69

Attachment	1	Sheet No.	25 of 31
Originator	N. K. Schiffern	Date	07/08/13
Checked	J. D. Skoglie	Date	07/08/13
Calc. No.	0100D-CA-V0508	Rev. No.	0

Attachment 1. 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	J1RJ78, FS-1			J1PWC9, FS-2			J1PWD0, FS-3			J1PWD1, FS-4		
		3/15/2013			9/18/2012			9/18/2012			9/18/2012		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
1,2,4-Trichlorobenzene	SVOA	28	U	28	27	U	27	27	U	27	26	U	26
1,2-Dichlorobenzene	SVOA	22	U	22	21	U	21	21	U	21	20	U	20
1,3-Dichlorobenzene	SVOA	12	U	12	12	U	12	12	U	12	11	U	11
1,4-Dichlorobenzene	SVOA	13	U	13	13	U	13	13	U	13	13	U	13
2,4,5-Trichlorophenol	SVOA	9.9	U	9.9	9.8	U	9.8	9.6	U	9.6	9.2	U	9.2
2,4,6-Trichlorophenol	SVOA	9.9	U	9.9	9.8	U	9.8	9.6	U	9.6	9.2	U	9.2
2,4-Dichlorophenol	SVOA	9.9	U	9.9	9.8	U	9.8	9.6	U	9.6	9.2	U	9.2
2,4-Dimethylphenol	SVOA	65	U	65	64	U	64	63	U	63	61	U	61
2,4-Dinitrophenol	SVOA	330	U	330	320	U	320	320	UX	320	310	U	310
2,4-Dinitrotoluene	SVOA	65	U	65	64	U	64	63	U	63	61	U	61
2,6-Dinitrotoluene	SVOA	28	U	28	27	U	27	27	U	27	26	U	26
2-Chloronaphthalene	SVOA	9.9	U	9.9	9.8	U	9.8	9.6	U	9.6	9.2	U	9.2
2-Chlorophenol	SVOA	21	U	21	20	U	20	20	U	20	19	U	19
2-Methylnaphthalene	SVOA	19	U	19	19	U	19	18	U	18	18	U	18
2-Methylphenol (cresol, o-)	SVOA	13	U	13	13	U	13	12	U	12	12	U	12
2-Nitroaniline	SVOA	49	U	49	49	U	49	48	U	48	46	U	46
2-Nitrophenol	SVOA	9.9	U	9.9	9.8	U	9.8	9.6	U	9.6	9.2	U	9.2
3,3'-Dichlorobenzidine	SVOA	89	U	89	88	U	88	86	U	86	83	U	83
3+4 Methylphenol (cresol, m+p)	SVOA	33	U	33	32	U	32	32	U	32	31	U	31
3-Nitroaniline	SVOA	72	U	72	71	U	71	70	U	70	68	U	68
4,6-Dinitro-2-methylphenol	SVOA	330	U	330	320	U	320	320	U	320	310	U	310
4-Bromophenylphenyl ether	SVOA	19	U	19	19	U	19	18	U	18	18	U	18
4-Chloro-3-methylphenol	SVOA	65	U	65	64	U	64	63	U	63	61	U	61
4-Chloroaniline	SVOA	81	U	81	80	U	80	79	U	79	76	U	76
4-Chlorophenylphenyl ether	SVOA	21	U	21	20	U	20	20	U	20	19	U	19
4-Nitroaniline	SVOA	72	U	72	71	U	71	70	U	70	67	U	67
4-Nitrophenol	SVOA	96	U	96	95	U	95	93	U	93	90	U	90
Acenaphthene	SVOA	10	U	10	10	U	10	9.9	U	9.9	9.5	U	9.5
Acenaphthylene	SVOA	17	U	17	17	U	17	16	U	16	16	U	16
Anthracene	SVOA	17	U	17	17	U	17	16	U	16	16	U	16
Benzo(a)anthracene	SVOA	22	J	20	20	U	20	19	U	19	18	U	18
Benzo(a)pyrene	SVOA	20	U	20	20	U	20	19	U	19	18	U	18
Benzo(b)fluoranthene	SVOA	35	JX	26	26	U	26	25	U	25	24	U	24
Benzo(ghi)perylene	SVOA	16	U	16	16	U	16	15	U	15	15	U	15
Benzo(k)fluoranthene	SVOA	39	UX	39	39	U	39	38	U	38	37	U	37
Bis(2-chloro-1-methylethyl)ether	SVOA	23	U	23	22	U	22	22	U	22	21	U	21
Bis(2-Chloroethoxy)methane	SVOA	23	U	23	22	U	22	22	U	22	21	U	21
Bis(2-chloroethyl) ether	SVOA	16	U	16	16	U	16	16	U	16	15	U	15
Bis(2-ethylhexyl) phthalate	SVOA	45	U	45	45	U	45	44	U	44	43	U	43
Butylbenzylphthalate	SVOA	42	U	42	42	U	42	41	U	41	40	U	40
Carbazole	SVOA	36	U	36	35	U	35	35	U	35	33	U	33
Chrysene	SVOA	29	J	27	26	U	26	26	U	26	25	U	25
Dibenz[a,h]anthracene	SVOA	19	U	19	19	U	19	18	U	18	18	U	18
Dibenzofuran	SVOA	20	U	20	20	U	20	19	U	19	18	U	18
Diethyl phthalate	SVOA	26	U	26	25	U	25	25	U	25	24	U	24
Dimethyl phthalate	SVOA	23	U	23	22	U	22	22	U	22	21	U	21
Di-n-butylphthalate	SVOA	29	U	29	28	U	28	28	U	28	27	U	27
Di-n-octylphthalate	SVOA	14	U	14	14	U	14	14	U	14	13	U	13
Fluoranthene	SVOA	36	J	36	35	U	35	35	U	35	33	U	33
Fluorene	SVOA	18	U	18	18	U	18	17	U	17	17	U	17
Hexachlorobenzene	SVOA	29	U	29	28	U	28	28	U	28	27	U	27
Hexachlorobutadiene	SVOA	9.9	U	9.9	9.8	U	9.8	9.6	U	9.6	9.2	U	9.2
Hexachlorocyclopentadiene	SVOA	49	U	49	49	U	49	48	U	48	46	U	46
Hexachloroethane	SVOA	21	U	21	21	U	21	20	U	20	20	U	20
Indeno(1,2,3-cd)pyrene	SVOA	22	U	22	21	U	21	21	U	21	20	U	20
Isophorone	SVOA	17	U	17	17	U	17	16	U	16	16	U	16
Naphthalene	SVOA	31	U	31	30	U	30	30	U	30	29	U	29
Nitrobenzene	SVOA	22	U	22	21	U	21	21	U	21	20	U	20
N-Nitroso-di-n-dipropylamine	SVOA	31	U	31	30	U	30	30	U	30	29	U	29
N-Nitrosodiphenylamine	SVOA	21	U	21	20	U	20	20	U	20	19	U	19
Pentachlorophenol	SVOA	330	U	330	320	U	320	320	U	320	310	U	310
Phenanthrene	SVOA	20	J	17	17	U	17	16	U	16	16	U	16
Phenol	SVOA	18	U	18	18	U	18	17	U	17	17	U	17
Pyrene	SVOA	37	J	12	15	J	12	12	U	12	11	U	11

Attachment	1	Sheet No.	26 of 31
Originator	N. K. Schiffern	Date	07/08/13
Checked	J. D. Skoglie	Date	07/08/13
Calc. No.	0100D-CA-V0508	Rev. No.	0

Attachment 1. 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Verification Sample Results (Organics).

CONSTITUENT	CLASS	J1PWD2, FS-5			J1PWD3, FS-6			J1R654, Equipment Blank		
		9/18/2012			9/18/2012			4/8/2013		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
1,2,4-Trichlorobenzene	SVOA	26	U	26	28	U	28	27	U	27
1,2-Dichlorobenzene	SVOA	21	U	21	22	U	22	21	U	21
1,3-Dichlorobenzene	SVOA	11	U	11	12	U	12	11	U	11
1,4-Dichlorobenzene	SVOA	13	U	13	13	U	13	13	U	13
2,4,5-Trichlorophenol	SVOA	9.4	U	9.4	9.9	U	9.9	9.5	U	9.5
2,4,6-Trichlorophenol	SVOA	9.4	U	9.4	9.9	U	9.9	9.5	U	9.5
2,4-Dichlorophenol	SVOA	9.4	U	9.4	9.9	U	9.9	9.5	U	9.5
2,4-Dimethylphenol	SVOA	62	U	62	65	U	65	63	U	63
2,4-Dinitrophenol	SVOA	310	U	310	330	U	330	320	U	320
2,4-Dinitrotoluene	SVOA	62	U	62	65	U	65	63	U	63
2,6-Dinitrotoluene	SVOA	26	U	26	28	U	28	27	U	27
2-Chloronaphthalene	SVOA	9.4	U	9.4	9.9	U	9.9	9.5	U	9.5
2-Chlorophenol	SVOA	20	U	20	21	U	21	20	U	20
2-Methylnaphthalene	SVOA	18	U	18	19	U	19	18	U	18
2-Methylphenol (cresol, o-)	SVOA	12	U	12	13	U	13	12	U	12
2-Nitroaniline	SVOA	47	U	47	49	U	49	48	U	48
2-Nitrophenol	SVOA	9.4	U	9.4	9.9	U	9.9	9.5	U	9.5
3,3'-Dichlorobenzidine	SVOA	84	U	84	89	U	89	86	U	86
3+4 Methylphenol (cresol, m+p)	SVOA	31	U	31	33	U	33	31	U	31
3-Nitroaniline	SVOA	68	U	68	72	U	72	69	U	69
4,6-Dinitro-2-methylphenol	SVOA	310	U	310	330	U	330	310	U	310
4-Bromophenylphenyl ether	SVOA	18	U	18	19	U	19	18	U	18
4-Chloro-3-methylphenol	SVOA	62	U	62	65	U	65	63	U	63
4-Chloroaniline	SVOA	77	U	77	81	U	81	78	U	78
4-Chlorophenylphenyl ether	SVOA	20	U	20	21	U	21	20	U	20
4-Nitroaniline	SVOA	68	U	68	72	U	72	69	U	69
4-Nitrophenol	SVOA	91	U	91	96	U	96	92	U	92
Acenaphthene	SVOA	9.6	U	9.6	10	U	10	9.8	U	9.8
Acenaphthylene	SVOA	16	U	16	17	U	17	16	U	16
Anthracene	SVOA	16	U	16	17	U	17	16	U	16
Benzo(a)anthracene	SVOA	19	U	19	20	U	20	19	U	19
Benzo(a)pyrene	SVOA	19	U	19	20	U	20	19	U	19
Benzo(b)fluoranthene	SVOA	25	U	25	26	U	26	25	U	25
Benzo(ghi)perylene	SVOA	15	U	15	16	U	16	15	U	15
Benzo(k)fluoranthene	SVOA	37	U	37	40	U	40	38	U	38
Bis(2-chloro-1-methylethyl)ether	SVOA	22	U	22	23	U	23	22	U	22
Bis(2-Chloroethoxy)methane	SVOA	22	U	22	23	U	23	22	U	22
Bis(2-chloroethyl) ether	SVOA	16	U	16	16	U	16	16	U	16
Bis(2-ethylhexyl) phthalate	SVOA	43	U	43	45	U	45	44	U	44
Butylbenzylphthalate	SVOA	40	U	40	43	U	43	41	U	41
Carbazole	SVOA	34	U	34	36	U	36	34	U	34
Chrysene	SVOA	25	U	25	27	U	27	26	U	26
Dibenz[a,h]anthracene	SVOA	18	U	18	19	U	19	18	U	18
Dibenzofuran	SVOA	19	U	19	20	U	20	19	U	19
Diethyl phthalate	SVOA	24	U	24	26	U	26	25	U	25
Dimethyl phthalate	SVOA	22	U	22	23	U	23	22	U	22
Di-n-butylphthalate	SVOA	27	U	27	29	U	29	28	U	28
Di-n-octylphthalate	SVOA	13	U	13	14	U	14	14	U	14
Fluoranthene	SVOA	34	U	34	36	U	36	34	U	34
Fluorene	SVOA	17	U	17	18	U	18	17	U	17
Hexachlorobenzene	SVOA	27	U	27	29	U	29	28	U	28
Hexachlorobutadiene	SVOA	9.4	U	9.4	9.9	U	9.9	9.5	U	9.5
Hexachlorocyclopentadiene	SVOA	47	U	47	49	U	49	48	U	48
Hexachloroethane	SVOA	20	U	20	21	U	21	20	U	20
Indeno(1,2,3-cd)pyrene	SVOA	21	U	21	22	U	22	21	U	21
Isophorone	SVOA	16	U	16	17	U	17	16	U	16
Naphthalene	SVOA	29	U	29	31	U	31	30	U	30
Nitrobenzene	SVOA	21	U	21	22	U	22	21	U	21
N-Nitroso-di-n-dipropylamine	SVOA	29	U	29	31	U	31	30	U	30
N-Nitrosodiphenylamine	SVOA	20	U	20	21	U	21	20	U	20
Pentachlorophenol	SVOA	310	U	310	330	U	330	310	U	310
Phenanthrene	SVOA	16	U	16	17	U	17	16	U	16
Phenol	SVOA	17	U	17	18	U	18	17	U	17
Pyrene	SVOA	11	U	11	12	U	12	12	U	12

Attachment	1	Sheet No.	27 of 31
Originator	N. K. Schiffern	Date	07/08/13
Checked	J. D. Skoglie	Date	07/08/13
Calc. No.	0100D-CA-V0508	Rev. No.	0

Attachment 1. 100-D-77, 100-D-62, and 100-D-83:1 Waste Site Verification Sample Results (Metals) Informational Purposes Only [b].

Sample Area	HEIS Number	Sample Date	Aluminum			Antimony			Arsenic			Barium			Beryllium			Boron		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-4	J1PW84	9/18/2012	8010	X	1.3	0.32	UJ	0.32	11.8		0.56	91.9		0.064	0.31		0.028	2.1		0.83
FS-1	J1PWC8	9/18/2012	6340		1.5	0.36	U	0.36	3.5		0.63	59.7		0.072	0.30		0.031	0.93	U	0.93

Sample Area	HEIS Number	Sample Date	Cadmium			Calcium			Chromium			Cobalt			Copper			Hexavalent Chromium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-4	J1PW84	9/18/2012	0.59		0.035	28900	X	11.9	18.1	X	0.049	7.1	X	0.085	27.5		0.18	0.319	J	0.155
SPA-8	J1R648	4/8/2013																0.155	U	0.155
SPA-10	J1R650	4/8/2013																0.205		0.155
SPA-11	J1R651	4/8/2013																0.204		0.155
FS-1	J1PWC8	9/18/2012	0.20		0.039	10400	X	13.4	9.2		0.055	7.9	X	0.095	15.4		0.21	0.168		0.155

Sample Area	HEIS Number	Sample Date	Iron			Lead			Magnesium			Manganese			Mercury			Molybdenum		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-4	J1PW84	9/18/2012	24000	X	3.2	54.6	X	0.23	4550	X	3.1	300	X	0.085	35.3		0.54	0.61	B	0.22
FS-1	J1PWC8	9/18/2012	23700	X	3.6	4.9		0.26	4750	X	3.5	312	X	0.095	0.076	M	0.0061	0.67	BM	0.25

Sample Area	HEIS Number	Sample Date	Nickel			Potassium			Selenium			Silicon			Silver			Sodium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-4	J1PW84	9/18/2012	13.1	X	0.10	1260		34.6	0.73	U	0.73	317	XJ	4.8	0.39		0.14	586		49.9
FS-1	J1PWC8	9/18/2012	10.5	X	0.12	1020		39.0	0.85	B	0.82	474	XN	5.4	0.15	U	0.15	322		56.1

Sample Area	HEIS Number	Sample Date	Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL
EXC-4	J1PW84	9/18/2012	59.3		0.079	421	X	0.34
FS-1	J1PWC8	9/18/2012	67.2		0.089	44.3	X	0.38

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Attachment 1. 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Verification Sample Results (Anions, Physical, and TPH)_Informational Purposes Only [b].

Sample Area	HEIS Number	Sample Date	Bromide			Chloride			Fluoride			Nitrogen in Nitrate			Nitrogen in Nitrite and Nitrate		
			mg/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	%	Q	PQL	pH	Q	PQL
EXC-4	J1PW84	9/18/2012	0.39	U	0.39	2.2	B	2.0	0.83	U	0.83	0.70	B	0.32	1.2		0.30
FS-1	J1PWC8	9/18/2012	0.38	U	0.38	2.0	B	1.9	0.80	UN	0.80	1.1	B	0.30	1.0	M	0.31

Sample Area	HEIS Number	Sample Date	Nitrogen in Nitrite			Phosphorous in phosphate			Sulfate			TPH- Diesel			TPH - Diesel EXT		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
EXC-4	J1PW84	9/18/2012	0.34	UR	0.34	1.3	UR	1.3	156		1.8	59000		650	160000		960
FS-1	J1PWC8	9/18/2012	0.33	UR	0.33	1.2	UNR	1.2	12.7		1.7	65000		640	90000		950

Sample Area	HEIS Number	Sample Date	Percent moisture (wet sample)			pH Measurement		
			%	Q	PQL	pH	Q	PQL
EXC-4	J1PW84	9/18/2012	1.4		0.10	9.26		0.100
FS-1	J1PWC8	9/18/2012	0.79		0.10	9.29		0.100

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Attachment 1. 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Verification Sample Results (Organics) _Informational Purposes Only [b].

CONSTITUENT	CLASS	J1PW84, EXC-4			J1PWC8, FS-1		
		9/18/2012			9/18/2012		
		ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	9.7	UJ	9.7	890	X	9.4
Acenaphthylene	PAH	8.7	U	8.7	55	JX	8.5
Anthracene	PAH	49	X	3.0	1400		2.9
Benzo(a)anthracene	PAH	88	XJ	3.1	2800		3.0
Benzo(a)pyrene	PAH	130	J	6.2	2000		6.1
Benzo(b)fluoranthene	PAH	150		4.1	2200		4.0
Benzo(ghi)perylene	PAH	130	X	7.0	1600		6.8
Benzo(k)fluoranthene	PAH	48	X	3.8	830		3.7
Chrysene	PAH	160	J	4.7	2300	X	4.6
Dibenz[a,h]anthracene	PAH	11	U	11	440	X	10
Fluoranthene	PAH	330	J	13	4600		12
Fluorene	PAH	25	JX	5.1	750		5.0
Indeno(1,2,3-cd)pyrene	PAH	120		12	1500		11
Naphthalene	PAH	12	U	12	11	U	11
Phenanthrene	PAH	160	J	12	3400		11
Pyrene	PAH	330	J	12	4700		11
Aroclor-1016	PCB	2.7	U	2.7	2.5	U	2.5
Aroclor-1221	PCB	7.8	U	7.8	7.4	U	7.4
Aroclor-1232	PCB	1.9	U	1.9	1.8	U	1.8
Aroclor-1242	PCB	4.5	U	4.5	4.3	U	4.3
Aroclor-1248	PCB	4.5	U	4.5	4.3	U	4.3
Aroclor-1254	PCB	2.5	U	2.5	2.4	U	2.4
Aroclor-1260	PCB	13		2.5	2.4	U	2.4
Aldrin	PEST	0.24	U	0.24	0.24	U	0.24
Alpha-BHC	PEST	0.21	U	0.21	0.21	U	0.21
alpha-Chlordane	PEST	0.31	U	0.31	0.31	U	0.31
beta-1,2,3,4,5,6-Hexachlorocyclohexane	PEST	0.64	U	0.64	0.64	U	0.64
Delta-BHC	PEST	0.39	U	0.39	0.39	U	0.39
Dichlorodiphenyldichloroethane	PEST	0.53	U	0.53	0.53	U	0.53
Dichlorodiphenyldichloroethylene	PEST	3.4		0.23	0.23	U	0.23
Dichlorodiphenyltrichloroethane	PEST	2.4	Y	0.57	0.57	U	0.57
Dieldrin	PEST	0.20	U	0.20	0.20	U	0.20
Endosulfan I	PEST	0.17	U	0.17	0.17	U	0.17
Endosulfan II	PEST	0.28	U	0.28	0.28	U	0.28
Endosulfan sulfate	PEST	0.27	U	0.27	0.27	U	0.27
Endrin	PEST	0.30	U	0.30	0.29	U	0.29
Endrin aldehyde	PEST	0.17	U	0.17	0.16	U	0.16
Endrin ketone	PEST	0.47	U	0.47	0.47	U	0.47
Gamma-BHC (Lindane)	PEST	0.45	U	0.45	0.45	U	0.45
gamma-Chlordane	PEST	0.26	U	0.26	0.26	U	0.26
Heptachlor	PEST	0.21	U	0.21	0.21	UN	0.21
Heptachlor epoxide	PEST	0.41	U	0.41	0.41	U	0.41
Methoxychlor	PEST	0.44	U	0.44	0.43	U	0.43
Toxaphene	PEST	15	UJ	15	15	U	15

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Checked	J. D. Skoglie	Date	07/08/13
Calc. No.	0100D-CA-V0508	Rev. No.	0

Attachment 1. 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Verification Sample Results (Organics) _Informational Purposes Only [b].

CONSTITUENT	CLASS	J1RKM6, SPA-10			J1RKM7, SPA-11		
		4/29/2013			4/29/2013		
		ug/kg	Q	PQL	ug/kg	Q	PQL
1,2,4-Trichlorobenzene	SVOA	27	U	27	28	U	28
1,2-Dichlorobenzene	SVOA	21	U	21	22	U	22
1,3-Dichlorobenzene	SVOA	11	U	11	12	U	12
1,4-Dichlorobenzene	SVOA	13	U	13	14	U	14
2,4,5-Trichlorophenol	SVOA	9.5	U	9.5	10	U	10
2,4,6-Trichlorophenol	SVOA	9.5	U	9.5	10	U	10
2,4-Dichlorophenol	SVOA	9.5	U	9.5	10	U	10
2,4-Dimethylphenol	SVOA	63	U	63	66	U	66
2,4-Dinitrophenol	SVOA	320	UJ	320	330	U	330
2,4-Dinitrotoluene	SVOA	63	U	63	66	U	66
2,6-Dinitrotoluene	SVOA	27	U	27	28	U	28
2-Chloronaphthalene	SVOA	9.5	U	9.5	10	U	10
2-Chlorophenol	SVOA	20	U	20	21	U	21
2-Methylnaphthalene	SVOA	18	U	18	19	U	19
2-Methylphenol (cresol, o-)	SVOA	12	U	12	13	U	13
2-Nitroaniline	SVOA	48	U	48	50	U	50
2-Nitrophenol	SVOA	9.5	U	9.5	10	U	10
3,3'-Dichlorobenzidine	SVOA	86	UJ	86	90	U	90
3+4 Methylphenol (cresol, m+p)	SVOA	31	U	31	33	U	33
3-Nitroaniline	SVOA	69	U	69	73	U	73
4,6-Dinitro-2-methylphenol	SVOA	310	UJ	310	330	U	330
4-Bromophenylphenyl ether	SVOA	18	U	18	19	U	19
4-Chloro-3-methylphenol	SVOA	63	U	63	66	U	66
4-Chloroaniline	SVOA	78	U	78	82	U	82
4-Chlorophenylphenyl ether	SVOA	20	U	20	21	U	21
4-Nitroaniline	SVOA	69	U	69	73	U	73
4-Nitrophenol	SVOA	92	U	92	97	U	97
Acenaphthene	SVOA	9.8	U	9.8	160	J	10
Acenaphthylene	SVOA	16	U	16	17	U	17
Anthracene	SVOA	24	J	16	400		17
Benzo(a)anthracene	SVOA	120	J	19	1700		20
Benzo(a)pyrene	SVOA	99	J	19	1300		20
Benzo(b)fluoranthene	SVOA	180	J	25	2300		26
Benzo(ghi)perylene	SVOA	59	J	15	800		16
Benzo(k)fluoranthene	SVOA	38	U	38	40	U	40
Bis(2-chloro-1-methylethyl)ether	SVOA	22	U	22	23	U	23
Bis(2-Chloroethoxy)methane	SVOA	22	U	22	23	U	23
Bis(2-chloroethyl) ether	SVOA	16	U	16	17	U	17
Bis(2-ethylhexyl) phthalate	SVOA	44	U	44	46	U	46
Butylbenzylphthalate	SVOA	41	U	41	43	U	43
Carbazole	SVOA	34	U	34	230	J	36
Chrysene	SVOA	170	J	26	1600		27
Dibenz[a,h]anthracene	SVOA	21	J	18	230	J	19
Dibenzofuran	SVOA	19	U	19	73	J	20
Diethyl phthalate	SVOA	25	U	25	26	U	26
Dimethyl phthalate	SVOA	22	U	22	23	U	23
Di-n-butylphthalate	SVOA	28	U	28	29	U	29
Di-n-octylphthalate	SVOA	14	U	14	14	U	14
Fluoranthene	SVOA	210	J	34	3100		36
Fluorene	SVOA	17	U	17	140	J	18
Hexachlorobenzene	SVOA	28	U	28	29	U	29
Hexachlorobutadiene	SVOA	9.5	U	9.5	10	U	10
Hexachlorocyclopentadiene	SVOA	48	U	48	50	U	50
Hexachloroethane	SVOA	20	U	20	21	U	21
Indeno(1,2,3-cd)pyrene	SVOA	46	J	21	690		22
Isophorone	SVOA	16	U	16	17	U	17
Naphthalene	SVOA	29	U	29	64	J	31
Nitrobenzene	SVOA	21	U	21	22	U	22
N-Nitroso-di-n-dipropylamine	SVOA	29	U	29	31	U	31
N-Nitrosodiphenylamine	SVOA	20	U	20	21	U	21
Pentachlorophenol	SVOA	310	U	310	330	U	330
Phenanthrene	SVOA	110	J	16	1700		17
Phenol	SVOA	17	U	17	18	U	18
Pyrene	SVOA	210	J	12	2700		12

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CALCULATION COVER SHEET

Project Title: 100-D Field Remediation **Job No. 14655**

Area: 100-D

Discipline: Environmental *Calculation No: 0100D-CA-V0509

Subject: 100-D-77, 100-D-62, and 100-D-83:1 Direct Contact Hazard Quotient and Carcinogenic Risk Calculations

Computer Program: Excel Program No: Excel 2003

The attached calculations have been generated to document compliance with established cleanup levels. These calculations should be used in conjunction with other relevant documents in the administrative record.

Committed Calculation ☒ Preliminary ☐ Superseded ☐ Voided ☐

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover = 1 Sheets = 4 Total = 5	N. K. Schiffern N. K. Schiffern	J. D. Skoglie [signature]	C. H. Dobie C. H. Dobie	D. F. Obenauer D. F. Obenauer	10/14/13

SUMMARY OF REVISION

WCH-DE-018 (05/08/2007) *Obtain Calc. No. from Document Control and Form from Intranet

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	N. K. Schiffern	Date:	07/01/13	Calc. No.:	0100D-CA-V0509	Rev.:	0
Project:	100-D Area Field Remediation	Job No:	14655	Checked:	J. D. Skoglie	Date:	07/01/13
Subject:	100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Direct Contact Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 1 of 4	

PURPOSE:

Provide documentation to support the calculation of the direct contact hazard quotient (HQ) and excess carcinogenic risk for the 100-D-77, 100-D-62, and 100-D-83:1 waste sites. In accordance with the remedial action goals (RAGs) in the remedial design report/remedial action work plan (RDR/RAWP) (DOE-RL 2009b), the following criteria must be met:

1) An HQ of <1.0 for all individual noncarcinogens
2) A cumulative HQ of <1.0 for noncarcinogens
3) An excess cancer risk of <1 x 10^{-6} for individual carcinogens
4) A cumulative excess cancer risk of <1 x 10^{-5} for carcinogens.

GIVEN/REFERENCES:

1) DOE-RL, 2009a, 100 Area Remedial Action Sampling and Analysis Plan, DOE/RL-96-22, Rev. 5, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

2) DOE-RL, 2009b, *Remedial Design Report/Remedial Action Work Plan for the 100 Areas*, DOE/RL-96-17, Rev. 6, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

3) EPA, 1994, *Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead in Children*, EPA/540/R-93/081, Publication No. 9285.7, U.S. Environmental Protection Agency, Washington, D.C.

4) WAC 173-340, "Model Toxics Control Act – Cleanup," *Washington Administrative Code*, 1996.

5) WCH, 2013, *100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Cleanup Verification 95% UCL Calculation*, 0100D-CA-V0508, Rev. 0, Washington Closure Hanford, Inc., Richland, Washington.

SOLUTION:

1) Generate an HQ for each noncarcinogenic constituent detected above background or required detection limit/practical quantitation limit and compare it to the individual HQ of <1.0 (DOE-RL 2009b).

2) Sum the HQs and compare this value to the cumulative HQ of <1.0.

3) Generate an excess cancer risk value for each carcinogenic constituent detected above background or required detection limit/practical quantitation limit and compare it to the excess cancer risk of <1 x 10^{-6} (DOE-RL 2009b).

4) Sum the excess cancer risk value(s) and compare it to the cumulative cancer risk of <1 x 10^{-5}.

Washington Closure Hanford, Inc.		CALCULATION SHEET					
Originator:	N. K. Schiffern NKS	Date:	07/08/13	Calc. No.:	0100D-CA-V0509	Rev.:	0
Project:	100-D Area Field Remediation	Job No:	14655	Checked:	J. D. Skoglie JDS	Date:	07/08/13
Subject:	100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Direct Contact Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 2 of 4	

METHODOLOGY:

The 100-D-77, 100-D-62, and 100-D-83:1 waste sites are comprised of two decision units for verification sampling, consisting of excavation and staging pile area. Also included were ten focused samples from excavation area. The direct contact hazard quotient and carcinogenic risk calculations for the 100-D-77, 100-D-62, and 100-D-83:1 waste sites were conservatively calculated for the entire waste sites using the greater of the statistical or maximum value for each analyte in all decision units from WCH (2013). Of the contaminants of potential concern (COPCs) for these sites, boron, hexavalent chromium, molybdenum, the detected polycyclic aromatic hydrocarbons (PAH), the detected semivolatiles (SVOC), aroclor-1260, and endosulfan sulfate require HQ and risk calculations because these analytes were detected and a Washington State or Hanford Site background value is not available. Vanadium requires HQ and risk calculations because this analyte was detected above a Washington State or Hanford Site background value. Although total petroleum hydrocarbons (diesel range extended) was detected and no background value is available, the risk associated with total petroleum hydrocarbons do not contribute to the cumulative toxicity calculation. All other site nonradionuclide COPCs were not detected or were quantified below background levels. An example of the HQ and risk calculations is presented below:

1) For example, the maximum value for boron is 1.7 mg/kg, divided by the noncarcinogenic RAG value of 7,200 mg/kg (calculated in accordance with the noncarcinogenic toxics effects formula in WAC 173-340-740[3]), is 2.4×10^{-4}. Comparing this value, and all other individual values, to the requirement of <1.0, this criterion is met.

2) After the HQ calculation is completed for the appropriate analytes, the cumulative HQ can be obtained by summing the individual values. (To avoid errors due to intermediate rounding, the individual HQ values prior to rounding are used for this calculation.) The sum of the HQ values is 2.1×10^{-1}. Comparing this value to the requirement of <1.0, this criterion is met.

3) To calculate the excess cancer risk, the maximum or statistical value is divided by the carcinogenic RAG value, and then multiplied by 1×10^{-6}. For example, the statistical value for hexavalent chromium is 0.313 mg/kg; divided by 2.1 mg/kg, and multiplied as indicated, is 1.5×10^{-7}. Comparing this value to the requirement of $<1 \times 10^{-6}$, this criterion is met.

4) After these calculations are completed for the carcinogenic analytes, the cumulative excess cancer risk is obtained by summing the individual values. The sum of the cumulative cancer risk values is 1.7×10^{-6}. Comparing this value to the requirement of $<1 \times 10^{-5}$, this criterion is met.

RESULTS:

1) List individual noncarcinogens and corresponding HQs >1.0: None
2) List the cumulative noncarcinogenic HQ >1.0: None
3) List individual carcinogens and corresponding excess cancer risk $>1 \times 10^{-6}$: None
4) List the cumulative excess cancer risk for carcinogens $>1 \times 10^{-5}$: None.

Table 1 shows the results of the calculations.

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	N. K. Schiffern	Date:	07/01/13	Calc. No.:	0100D-CA-V0509	Rev.:	0
Project:	100-D Area Field Remediation	Job No:	14655	Checked:	J. D. Skoglie	Date:	07/01/13
Subject:	100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Direct Contact Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 3 of 4	

Table 1. Direct Contact Hazard Quotient and Excess Cancer Risk Results for the 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites.

Contaminant of Potential Concern[a]	Maximum or Statistical Value[a] (mg/kg)	Noncarcinogen RAG[b] (mg/kg)	Hazard Quotient	Carcinogen RAG[b] (mg/kg)	Carcinogen Risk
Metals					
Boron	1.7	7,200	2.4E-04	--	--
Chromium, hexavalent [c]	0.313	240	1.3E-03	2.1	1.5E-07
Molybdenum	0.51	400	1.3E-03	--	--
Vanadium	113	560	2.0E-01	--	--
Total Petroleum Hydrocarbons					
TPH - Diesel Range EXT [d]	24	200	--	--	--
Polycyclic Aromatic Hydrocarbons					
Acenapthene	0.19	4,800	4.0E-05	--	--
Acenapthylene[e]	0.013	4,800	2.7E-06	--	--
Anthracene	0.39	24,000	1.6E-05	--	--
Benzo(a)anthracene	0.66	--	--	1.37	4.8E-07
Benzo(a)pyrene	0.033	--	--	0.137	2.4E-07
Benzo(b)fluoranthene	0.50	--	--	1.37	3.6E-07
Benzo(ghi)perylene[e]	0.32	2,400	1.3E-04	--	--
Benzo(k)fluoranthene	0.18	--	--	1.37	1.3E-07
Chrysene	0.56	--	--	13.7	4.1E-08
Dibenz(a,h)anthracene	0.092	--	--	1.37	6.7E-08
Fluoranthene	1.2	3,200	3.8E-04	--	--
Fluorene	0.25	3,200	7.8E-05	--	--
Indeno(1,2,3-cd) pyrene	0.30	--	--	1.37	2.2E-07
Phenanthrene [e]	1.2	24,000	5.0E-05	--	--
Pyrene	1.3	2,400	5.4E-04	--	--
Semivolatiles					
2-Methylnaphthalene	0.12	320	3.8E-04	--	--
Carbazole	0.57	--	--	50	1.1E-08
Dibenzofuran	0.34	160	2.1E-03	--	--
Polychlorinated Biphenyls					
Aroclor-1260	0.0086	--	--	0.5	1.7E-08
Pesticides					
Endosulfan sulfate	0.00033	480	6.9E-07	--	--
Totals					
Cumulative Hazard Quotient:			**2.1E-01**		
Cumulative Excess Cancer Risk:					**1.7E-06**

Note:

-- = not applicable RAG = remedial action goal

[a] = From WCH (2013). Method 8310 (PAH) results were used in place of method 8270 (SVOA) when similar analytes were detected.

[b] = Value obtained from the RDR/RAWP (DOE-RL 2009b) or *Washington Administrative Code* (WAC) 173-340-740(3), Method B, 1996, unless otherwise noted.

[c] = Value for the carcinogen RAG calculated based on the inhalation exposure pathway (WAC) 173-340-750(3), 1996.

[d] =The risk associated with total petroleum hydrocarbons do not contribute to the cumulative toxicity calculation.

[e] =Toxicity data for these chemicals are not available. The cleanup levels are based on use of surrogate chemicals. acenapthylene surrogate: acenapthene; benzo(ghi)perylene surrogate: pyrene; phenanthrene surrogate: anthracene.

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	N. K. Schiffern	Date:	07/01/13	Calc. No.:	0100D-CA-V0509	Rev.:	0
Project:	100-D Area Field Remediation	Job No:	14655	Checked:	J. D. Skoglie	Date:	07/01/13
Subject:	100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Direct Contact Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 4 of 4	

CONCLUSION:

This calculation demonstrates that the 100-D-77, 100-D-62, and 100-D-83:1 waste sites meet the requirements for the direct contact hazard quotients and excess carcinogenic risk as identified in the RDR/RAWP (DOE-RL 2009b) and SAP (DOE-RL 2009a).

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CALCULATION COVER SHEET

Project Title: 100-D Field Remediation **Job No. 14655**

Area: 100-D

Discipline: Environmental Calculation No: 0100D-CA-V0510

Subject: 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Hazard Quotient and Carcinogenic Risk Calculations for Protection of Groundwater

Computer Program: Excel Program No: Excel 2003

The attached calculations have been generated to document compliance with established cleanup levels. These calculations should be used in conjunction with other relevant documents in the administrative record.

Committed Calculation ☒ Preliminary ☐ Superseded ☐ Voided ☐

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover = 1 Summary = 3 Total = 4	N. K. Schiffern N. K. Schiffern	C. H. Dobie C H Dobie	J. D. Skoglie	D. F. Obenauer D. F. Obenauer	10/14/13

SUMMARY OF REVISION

WCH-DE-018 (05/08/2007)

DE01-437.03

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	N. K. Schiffern	Date:	7/2/2013	Calc. No.:	0100D-CA-V0510	Rev.:	0
Project:	100-D Area Field Remediation	Job No:	14655	Checked:	C. H. Dobie	Date:	7/2/2013
Subject:	100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Hazard Quotient and Carcinogenic Risk Calculation for Protection of Groundwater					Sheet No. 1 of 3	

PURPOSE:

Provide documentation to support the calculation of the hazard quotient (HQ) and excess carcinogenic risk associated with soil contaminant levels compared to soil cleanup levels for protection of groundwater for the 100-D-77, 100-D-62, and 100-D-83:1 waste sites. In accordance with the remedial action goals (RAGs) in the remedial design report/remedial action work plan (RDR/RAWP) (DOE-RL 2009), the following criteria must be met:

1) An HQ of <1.0 for all individual noncarcinogens
2) A cumulative HQ of <1.0 for noncarcinogens
3) An excess cancer risk of $<1 \times 10^{-6}$ for individual carcinogens
4) A cumulative excess cancer risk of $<1 \times 10^{-5}$ for carcinogens.

GIVEN/REFERENCES:

1) BHI, 2005, *100 Area Analogous Sites RESRAD Evaluation*, Calculation No. 0100X-CA-V0050 Rev 0, Bechtel Hanford, Inc., Richland, Washington.

2) DOE-RL, 2009, *Remedial Design Report/Remedial Action Work Plan for the 100 Areas,* DOE/RL-96-17, Rev. 6, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

3) WAC 173-340, "Model Toxics Control Act – Cleanup," *Washington Administrative Code*, 1996.

4) WCH, 2013, *Remaining Sites Verification Package for the 100-D-62, 183-DR Headhouse Septic Tank; 100-D-77, 183-DR Acid Facility; 100-D-83:1, 183-DR Acid Addition Pipeline,* Attachment to Waste Site Reclassification Forms 2013-077, 2013-078, 2013-079, Washington Closure Hanford, Inc., Richland, Washington.

SOLUTION:

1) Generate a HQ for each noncarcinogenic constituent detected above background in soil and with a K_d less than that required to show no migration to groundwater in 1,000 years using the RESRAD generic site model (BHI 2005).

2) Sum the HQs and compare this value to the cumulative HQ of <1.0.

3) Generate an excess cancer risk value for each carcinogenic constituent detected above background in soil and with a K_d less than that required to show no migration to groundwater in 1,000 years using the RESRAD generic site model (BHI 2005).

4) Sum the excess cancer risk value(s) and compare it to the cumulative cancer risk of $<1 \times 10^{-5}$.

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	N. K. Schiffern NKS	Date:	7/8/2013	Calc. No.:	0100D-CA-V0510	Rev.:	0
Project:	100-D Area Field Remediation	Job No:	14655	Checked:	C. H. Dobie CD	Date:	7/8/2013
Subject:	100-D-77, 100-D-62, and 100-D-83:1 Waste Sites Hazard Quotient and Carcinogenic Risk Calculation for Protection of Groundwater					Sheet No. 2 of 3	

METHODOLOGY:

The 100-D-77, 100-D-62, and 100-D-83:1 waste sites were divided into two decision units for the purpose of verification sampling; excavation and staging pile area. Also included were ten focused samples from excavation samples. Hazard quotient and carcinogenic risk calculations for potential impact to groundwater at the 100-D-77, 100-D-62, and 100-D-83:1 waste sites were conservatively calculated for the entire waste sites using the greater of the statistical or maximum value for each analyte in all decision units from the 95% UCL calculation (WCH 2013). Based on this model and a vadose zone of approximately 16.0 m (52.5ft) thickness, a K_d of 4.6 or greater is required to show no predicted migration to groundwater in 1,000 years. The carbazole result from sample location EXC-3 was excluded from the calculation as discussed in the RSVP (WCH 2013). Of the contaminants of potential concern (COPCs) for these sites, boron, hexavalent chromium, 2-methylnaphthalene, and endosulfan sulfate are included because no Washington State or Hanford background value has been established and the distribution coefficients are less than that necessary to show no migration to groundwater in 1,000 years using the generic site RESRAD model (BHI 2005). All other site nonradionuclide COPCs were not detected, quantified below background levels, or have a K_d greater than or equal to 4.6. An example of the HQ and risk calculations for soil constituents with a potential impact to groundwater is presented below:

1) The hazard quotient is defined as the ratio of the dose of a substance obtained over a specified time (mg/kg/day) to a reference dose for the same substance derived over the same specified time (mg/kg/day). The hazard quotient can also be calculated as the ratio of the concentration in soil (maximum or statistical value) (mg/kg) to the soil RAG (mg/kg) for protection of groundwater, where the RAG is the groundwater cleanup level (mg/L) (calculated with, and related to the hazard quotient through, WAC 173-340-720(3)(a)(ii)(A), 1996) x 100 x 1 mg/1000 mg (conversion factor). This is based on the "100 times rule" of WAC 173-340-740(3)(a)(ii)(A) (1996). For example, the maximum value for boron of 1.7 mg/kg, divided by the noncarcinogenic RAG value of 320 mg/kg is 5.3×10^{-3}. Comparing this value to the requirement of <1.0, this criterion is met.

2) After the HQ calculation is completed for the appropriate analytes, the cumulative HQ can be obtained by summing the individual values. (To avoid errors due to intermediate rounding, the individual HQ values prior to rounding are used for this calculation.) The cumulative HQ for the 100-D-77, 100-D-62, and 100-D-83:1 waste sites is 1.1×10^{-1}. Comparing this value to the requirement of <1.0, this criterion is met.

3) To calculate the excess cancer risk, the maximum or statistical value is divided by the carcinogenic RAG value, and then multiplied by 1×10^{-6}. There were not any detected constituents with a carcinogenic RAG associated with the 100-D-77, 100-D-62, and 100-D-83:1 waste sites. Therefore, the requirement of $<1 \times 10^{-6}$ is met. The criterion for cumulative excess cancer risk for carcinogens of $<1 \times 10^{-5}$ is also met.

4) The soil cleanup RAGs for protection of groundwater are based on the "100 times" provision in WAC 173-340-740(3)(a)(ii)(A). WAC 173-340-740(3)(a)(ii)(A) (1996) provides the "100 times rule" but also states "unless it can be demonstrated that a higher soil concentration is protective of ground water at the site." When the "100 times rule" values are exceeded, RESRAD was used to demonstrate that higher soil concentrations may be protective of groundwater.

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RESULTS:

1) List individual noncarcinogens and corresponding HQs >1.0: None
2) List the cumulative noncarcinogenic HQ >1.0: None
3) List individual carcinogens and corresponding excess cancer risk >1 x 10^{-6}: None
4) List the cumulative excess cancer risk for carcinogens >1 x 10^{-5}: None.

Table 1 shows the results of the calculations.

Table 1. Hazard Quotient and Excess Cancer Risk Results for the 100-D-77, 100-D-62, and 100-D-83:1 Waste Sites.

Contaminants of Potential Concern[a]	Maximum or Statistical Value[a] (mg/kg)	Noncarcinogen RAG[b] (mg/kg)	Hazard Quotient	Carcinogen RAG[b] (mg/kg)	Carcinogen Risk
Metals					
Boron	1.7	320	5.3E-03	--	--
Chromium, hexavalent	0.313	4.8	6.5E-02	--	--
Semivolatiles					
2-Methylnaphthalene	0.12	3.2	3.8E-02	--	--
Pesticides					
Endosulfan (I, II, sulfate)	0.00033	9.6	3.4E-05	--	--
Totals					
Cumulative Hazard Quotient:			**1.1E-01**		
Cumulative Excess Cancer Risk:					**0.0E+00**

Notes:

[a] = From WCH (2013).

[b] = Value obtained from the Cleanup Levels and Risk Calculations (CLARC) database using Groundwater, Method B, results and the "100 times" model.

-- = not applicable

RAG = remedial action goal

CONCLUSION:

This calculation demonstrates that the 100-D-77, 100-D-62, and 100-D-83:1 waste sites meet the requirements for the hazard quotients and excess carcinogenic risk for protection of groundwater as identified in the RDR/RAWP (DOE-RL 2009).

APPENDIX D

DATA QUALITY ASSESSMENT

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A data quality assessment (DQA) was performed to compare the verification sampling approach and resulting analytical data with the sampling and data requirements specified in the site-specific sample design (WCH 2013c). This DQA was performed in accordance with site-specific data quality objectives found in the *100 Area Remedial Action Sampling and Analysis Plan* (SAP) (DOE-RL 2009).

A review of the sample design (WCH 2013d), the field logbooks (WCH 2012a, 2013a, 2013b, 2013c), and applicable analytical data packages has been performed as part of this DQA. All samples were collected and analyzed per the sample design. To ensure quality data, the SAP data assurance requirements and the data validation procedures for chemical analysis and radiochemical analysis (BHI 2000) are used as appropriate. This review involves evaluation of the data to determine if they are of the right type, quality, and quantity to support the intended use (i.e., closeout decisions). The DQA completes the data life cycle (i.e., planning, implementation, and assessment) that was initiated by the data quality objectives process (EPA 2006).

Verification sample data collected at the 100-D-62, 100-D-77, and 100-D-83:1 waste sites were provided by the laboratories in nine sample delivery groups (SDGs): J01591, J01596, J01597, K3993, J01750, JP0518, ZP0004, JP0527, and JP0571. SDG J01596 was submitted for third-party validation. Major and minor deficiencies are discussed for the 100-D-62, 100-D-77, and 100-D-83:1 data set, as follows below. If no comments are made about a specific analysis, it should be assumed that no deficiencies affecting the quality of the data were found.

MAJOR DEFICIENCIES

In the ion chromatograph (IC) anions analysis, the holding times for nitrate, nitrite, and orthophosphate in method 300.0 were exceeded by more than twice the limit for SDGs J01591, J01596, J01597, K3993, J01750, JP0518, ZP0004, and JP0571. All undetected nitrate, nitrite and orthophosphate results in these SDGs were qualified as rejected with "UR" flags. Rejection of the undetected nitrate, nitrite, and orthophosphate data does not hinder the evaluation of the 100-D-62, 100-D-77, and 100-D-83:1 waste sites. The only contaminant of potential concern (COPC) identified with the IC anions analysis (EPA method 300.0) in the sample design is sulfate (WCH 2013d). Nitrate is an identified COPC for verification sampling but was quantified using EPA method 353.2 (WCH 2013d). The resulting data set is sufficient for decision-making purposes.

In the IC anions analysis in SDG JP0527, the matrix spike (MS) recoveries were outside of quality control (QC) limits for nitrite (0%) and bromide (14%). All nondetected nitrite and bromide results were qualified as rejected with "UR" flags. Rejection of the undetected nitrite and bromide data does not hinder the evaluation of the 100-D-62, 100-D-77, and 100-D-83:1

waste sites. The only COPC identified with the IC anions analysis (EPA method 300.0) in the verification work instruction is sulfate (WCH 2013d). Nitrate is an identified COPC for verification sampling but was quantified using EPA method 353.2 (WCH 2013d). The resulting data set is sufficient for decision-making purposes.

MINOR DEFICIENCIES

SDG J01596

This SDG is composed of 13 statistical soil samples (J1PW81 through J1PW89 and J1PW90 through J1PW93) collected from the 100-D-62, 100-D-77, and 100-D-83:1 excavation area on September 18, 2012. This SDG includes a field duplicate pair (J1PW83/J1PW93). These samples were analyzed for inductively coupled plasma (ICP) metals, mercury, hexavalent chromium, IC anions, nitrate/nitrite, semivolatile organic compounds (SVOCs), polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCBs), total petroleum hydrocarbons (TPH), and pesticides. SDG J01596 was submitted for third-party validation. Minor deficiencies are as follows:

In the pesticides analysis, no MS, matrix spike duplicate (MSD), or laboratory control sample (LCS) was performed for toxaphene. The laboratory typically quantitates toxaphene but does not include toxaphene in quality assurance (QA)/QC samples. Third-party validation qualified all toxaphene results as estimated with "J" flags. Estimated data are usable for decision-making purposes.

In the ICP metals analysis the MS recoveries for aluminum (1,107%), antimony (48%), iron (1,730%), manganese (187%), and silicon (-14%) were outside of project QC limits. For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. The deficiency in the MS is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample. Antimony and silicon did not have mismatched spike and native concentrations in the MS. All antimony and silicon results were qualified as estimated with "J" flags by third-party validation. All aluminum, iron, and manganese results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery was below the QC criteria for silicon (11%). All silicon data were qualified by third-party validation as estimated with "J" flags. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, chromium was detected in the method blank (MB) at a concentration less than twice the method detection limit (MDL). Method blank contamination of this magnitude has no significant impact on the field sample results. The data are usable for decision-making purposes.

In the PAH analysis, the MS recoveries were outside of QC limits for acenaphthene (185%), benzo(a)anthracene (207%), fluoranthene (219%), phenanthrene (-53%), and pyrene (217%).

All associated results were qualified as estimated with "J" flags by third-party validation. Estimated data are acceptable for decision-making purposes.

In the PAH analysis, all MSD recoveries were within QC limits; however, the MS/MSD relative percent difference (RPD) calculations were above the QC limit for acenaphthene (37%), benzo(a)anthracene (46%), benzo(a)pyrene (31%), chrysene (32%), fluoranthene (61%), phenanthrene (169%), and pyrene (54%). Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. All associated results were qualified as estimated with "J" flags by third-party validation. Estimated data are acceptable for decision-making purposes.

In the SVOC analysis, the LCS recoveries were below QC limits for 3,3'-dichlorobenzidine (47%). Additionally, the MS recoveries were below QC limits for 4,6-dinitro-2-methylphenol (46%) and 2,4-dinitrophenol (33%), and the MSD recoveries were below QC limits for 2,4-dinitrophenol (49%). The MS/MSD RPD calculations were above the QC limit for 4,6-dinitro-2-methylphenol (39%) and 2,4-dinitrophenol (37%). Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. All associated results of these analytes were qualified as estimated with "J" flags by third-party validation. Estimated data are acceptable for decision-making purposes.

In the IC anions analysis, holding times were exceeded by more than twice the specified holding time for nitrate, nitrite, and orthophosphate. The nondetected results for these analytes are discussed above in the Major Deficiencies section. All detected nitrate, nitrite, and orthophosphate results were qualified as estimated with "J" flags by third-party validation. Estimated data are usable for decision-making purposes.

In the hexavalent chromium analysis, the MS recovery was below QC limits at 62%. All associated hexavalent chromium results were qualified as estimated with "J" flags by third-party validation. Estimated data are acceptable for decision-making purposes.

SDG J01597

This SDG is composed of six focused soil samples (J1PWC8 through J1PWC9 and J1PWD0 through J1PWD3) collected from the 100-D-62, 100-D-77, and 100-D-83:1 excavation area on September 18, 2012. These samples were analyzed for ICP metals, mercury, hexavalent chromium, IC anions, nitrate/nitrite, SVOCs, PAH, PCBs, TPH, and pesticides. Minor deficiencies are as follows:

In the SVOC analysis, the MS and/or MSD recoveries were below project QC limits for 2,4-dinitrophenol (38% and 45%). Although not qualified for MS/MSD recovery outside of QC limits, all results associated with 2,4-dinitrophenol may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the pesticide analysis, there was no MS, MSD, or LCS for toxaphene. The laboratory typically quantitates toxaphene but does not include toxaphene in QA/QC samples.

Although not qualified for the lack of MS, MSD, or LCS analyses, all toxaphene results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery was below the QC project criteria for silicon (8%). Although not qualified for the LCS recovery outside of QC limits, all silicon data may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, iron was detected in the MB at a concentration less than three times the MDL. Method blank contamination of this magnitude has no significant impact on the field sample results. The data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries for aluminum (1,116%), antimony (56%), iron (2,444%), manganese (150%), and silicon (30%) were outside of QC limits. For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. The deficiency in the MS is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample. Antimony and silicon did not have mismatched spike and native concentrations in the MS. Although not qualified for MS recoveries outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the ICP metals analysis, the RPD calculation from the laboratory duplicate analysis was above the QC limit for molybdenum (54%). Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPD calculation outside of QC limits, all molybdenum results may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the IC anions analysis, holding times were exceeded by more than twice the specified holding time for nitrate, nitrite, and orthophosphate. The nondetected results for these analytes are discussed above in the Major Deficiencies section. Although not qualified for the holding time exceedance, all detected nitrate, nitrite, and orthophosphate results may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the nitrate/nitrite analysis, the RPD calculated from the laboratory duplicate analysis was above the QC limit at 46%. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPD calculation outside of QC limits, all nitrate/nitrite results may be considered estimated. Estimated data are acceptable for decision-making purposes.

SDG K3993

This SDG is composed of one soil sample (J1PWF8) collected from the 100-D-62, 100-D-77, and 100-D-83:1 excavation area. This SDG includes the split sample associated with sample J1PW83. The sample was analyzed for ICP metals, mercury, hexavalent chromium, IC anions, nitrate/nitrite, SVOCs, PAH, PCBs, TPH, and pesticides. Minor deficiencies are as follows:

In the SVOC analysis, the LCS recoveries were below QC limits for 10 of the 64 analytes. Although not qualified for LCS recoveries outside of QC limits, all results associated with these analytes may be considered estimated. Estimated data are acceptable for decision-making purposes.

The MS recoveries were outside of QC limits for 2,4-dinitrophenol (42%), 4-chloroaniline (44%), hexachlorocyclopentadiene (13%), and pentachlorophenol (35%). The MSD recoveries were outside of QC limits 2,4-dinitrophenol (42%), fluoranthene (158%), hexachlorocyclopentadiene (16%), and phenanthrene (161%). Elevated concentrations of target analytes were present in the sample. Although not qualified for MS/MSD recoveries outside of QC limits, all 2,4-dinitrophenol, 4-chloroaniline, fluoranthene, hexachlorocyclopentadiene, and pentachlorophenol results may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the SVOC analysis, the MS/MSD RPD calculation was above the QC limits for 2,4,6-trichlorophenol (37%), pentachlorophenol (37%), and phenanthrene (31%). Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for MS/MSD RPD calculations outside of QC limits, the 2,4,6-trichlorophenol, pentachlorophenol, and phenanthrene results may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the pesticide analysis, there was no MS, MSD, or LCS for toxaphene. The laboratory typically quantitates toxaphene but does not include toxaphene in QA/QC samples. Although not qualified for the lack of MS, MSD, or LCS analyses, all toxaphene results may be considered estimated. Estimated data are usable for decision-making purposes.

In the pesticides analysis, the MSD recoveries were outside of QC limits for methoxychlor (230%). The MS/MSD RPD calculation was above the QC limit for methoxychlor (73.7%). Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for MSD recovery or RPD calculations outside of QC limits, all methoxychlor results may be considered estimated. Estimated data are acceptable for decision-making purposes

In the PAH analysis, the MS and MSD recoveries were outside of QC limits for 7 and 6, respectively, of the 16 analytes. The MS/MSD RPD calculations were outside of QC limits for 11 of the 16 analytes. Elevated concentrations of target analytes were present in the sample. Although not qualified for MS/MSD recoveries or RPD calculations outside of QC limits, all associated results may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the ICP metals analysis, the LCS recovery was above the QC project criteria for aluminum (140%). Although not qualified for the LCS recovery outside of QC limits, all silicon data may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, magnesium was detected in the MB at a concentration less than one-tenth the reporting limit (RL). Method blank contamination of this magnitude has no significant impact on the field sample results. The data are usable for decision-making purposes.

In the ICP metals analysis the MS recoveries for aluminum (444%), antimony (26.9%), iron (530%), and silicon (65.1%) were outside of QC limits. For aluminum and iron, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. The deficiency in the MS is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample. Antimony and silicon did not have mismatched spike and native concentrations in the MS. To confirm quantitation, a post-digestion spike (PDS) and serial dilution was prepared for all subject analytes. Recovery in the PDS was acceptable for all analytes except iron (48.6%). Although not qualified for MS recoveries outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the IC anions analysis, holding times were exceeded by more than twice the specified holding time for nitrate, nitrite, and orthophosphate. The nondetected results for these analytes are discussed above in the Major Deficiencies section. Although not qualified for the holding time exceedance, all detected nitrate, nitrite, and orthophosphate results may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the IC anions analysis, sulfate was detected in the MB at a concentration less than twice the limit of detection. Method blank contamination of this magnitude has no significant impact on the field sample results. The data are usable for decision-making purposes.

SDG J01750

This SDG is composed of one statistical (J1RJ77) and one focused (J1RJ78) soil sample collected from the 100-D-62, 100-D-77, and 100-D-83:1 excavation area on March 15, 2013. These samples were analyzed for ICP metals, mercury, hexavalent chromium, IC anions, nitrate/nitrite, SVOCs, PAH, PCBs, TPH, and pesticides. Minor deficiencies are as follows:

In the SVOC analysis, the LCS recoveries were below project QC limits for 4-chloroaniline (42%) and 3,3'dichlorobenzidine (36%). All 4-chloroaniline and 3,3'dichlorobenzidine results may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the pesticide analysis, there was no MS, MSD, or LCS for toxaphene. The laboratory typically quantitates toxaphene but does not include toxaphene in QA/QC samples. Although not qualified for the lack of MS, MSD, or LCS analyses, all toxaphene results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery was below the QC project criteria for silicon (7%). All silicon data may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, barium and chromium were detected in the MB at a concentration less than three times the MDL. Method blank contamination of this magnitude has no significant impact on the field sample results. The data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries for aluminum (943%), antimony (55%), iron (1,621%), manganese (203%), and silicon (31%) were outside of QC limits. For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. The deficiency in the MS is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample. Antimony and silicon did not have mismatched spike and native concentrations in the MS. Although not qualified for MS recoveries outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the IC anions analysis, holding times were exceeded by more than twice the specified holding time for nitrate, nitrite, and orthophosphate. The nondetected results for these analytes are discussed above in the Major Deficiencies section. Although not qualified for the holding time exceedance, all detected nitrate, nitrite, and orthophosphate results may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the pesticides analysis, the MSD recovery was outside of QC limits for beta-BHC (24%). The MS/MSD RPD calculations were above the QC limit for beta-BHC (58%), delta-BHC (32%), endosulfan sulfate (62%), and endrin aldehyde (39%). Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for MSD recovery or MS/MSD RPD calculations outside of QC limits, all beta-BHC, delta-BHC, endosulfan sulfate, and endrin aldehyde results may be considered estimated. Estimated data are acceptable for decision-making purposes.

SDG JP0518

This SDG was originally composed of 11 statistical soil samples (J1R641 through J1R648, J1R650, J1R651, and J1R653) collected from 10 of 12 sample locations at the staging pile area (SPA) on April 8, 2013. This SDG includes a field duplicate pair (J1R645/J1R653).

On April 8, 2013, 10 of the 12 SPA locations were sampled. After the sample collection, it was determined that 5 of the 12 SPA sample locations (SPA-8 through SPA-12) required new statistical locations. However, samples had been collected at three of the five locations (SPA-8, SPA-10, and SPA-11). After determining that new sample locations were needed, the laboratory was contacted to cancel the analyses for the three samples collected at SPA-8, SPA-10, and SPA-11 (J1R648, J1R650, and J1R651). All analyses except for hexavalent chromium were successfully canceled. All samples in the SDG were analyzed for hexavalent chromium. Samples J1R641 through J1R647 and J1R653 were analyzed for ICP metals, mercury, IC anions, nitrate/nitrite, SVOCs, PAH, PCBs, TPH, and pesticides. In addition, one equipment blank (J1R654) was analyzed for ICP metals, mercury, and SVOCs. Minor deficiencies are as follows:

In the SVOC analysis, LCS recoveries were below project QC limits for 4-chloroaniline (45%) and 3,3'-dichlorobenzidine (48%). Although not qualified for MS/MSD recovery outside of QC limits, all results associated with 4-chloroaniline and 3,3'-dichlorobenzidine may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the pesticide analysis, there was no MS, MSD, or LCS for toxaphene. The laboratory typically quantitates toxaphene but does not include toxaphene in QA/QC samples. Although not qualified for the lack of MS, MSD, or LCS analyses, all toxaphene results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery was below the QC project criteria for silicon (5%). Although not qualified for the LCS recovery outside of QC limits, all silicon data may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, aluminum, calcium, iron, and manganese were detected in the MB at a concentration less than twice the MDL. Method blank contamination of this magnitude has no significant impact on the field sample results. The data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries for aluminum (1,010%), antimony (56%), iron (2,282%), manganese (284%), and silicon (23%) were outside of QC limits. For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. The deficiency in the MS is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample. Antimony and silicon did not have mismatched spike and native concentrations in the MS. Although not qualified for MS recoveries outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the ICP metals analysis, the RPD calculations from the laboratory duplicate analysis were above the QC limit for chromium (59%) and nickel (51%). Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPD results outside of QC limits, all chromium and nickel data may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the mercury analysis, the RPD calculation from the laboratory duplicate analysis was above the QC limit at 31%. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPD results outside of QC limits, all mercury data may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the IC anions analysis, holding times were exceeded by more than twice the specified holding time for nitrate, nitrite, and orthophosphate. The nondetected results for these analytes are discussed above in the Major Deficiencies section. Although not qualified for the holding time exceedance, all detected nitrate, nitrite, and orthophosphate results may be considered estimated. Estimated data are acceptable for decision-making purposes.

SDG ZP0004

This SDG is composed of one soil sample (J1R670) collected from the SPA area on April 8, 2013. This SDG includes the split sample associated with sample J1R645. The sample was analyzed for ICP metals, mercury, hexavalent chromium, IC anions, nitrate/nitrite, SVOCs, PAH, PCBs, TPH, and pesticides. Minor deficiencies are as follows:

In the SVOC analysis, the MS recoveries were outside of QC limits for 4,6-dinitro-2-methylphenol (48%), 2,4-dinitrophenol (30%), and hexachlorocyclopentadiene (39%). The MSD recoveries were outside of project QC limits 2,4-dinitrophenol (31%) and hexachlorocyclopentadiene (46%). Although not qualified for MS/MSD recoveries outside of QC limits, all results associated with these analytes may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the pesticide analysis, there was no MS, MSD, or LCS for toxaphene. The laboratory typically quantitates toxaphene but does not include toxaphene in QA/QC samples. Although not qualified for the lack of MS, MSD, or LCS analyses, all toxaphene results may be considered estimated. Estimated data are usable for decision-making purposes.

In the PAH analysis, the RPD calculations for the MS/MSD recoveries were outside of QC limits for benzo(a)pyrene (31%), fluoranthene (38%), phenanthrene (38%), and pyrene (48%). Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for MS/MSD recovery RPD calculations outside of QC limits, the benzo(a)pyrene, fluoranthene, phenanthrene, and pyrene results may be considered estimated. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Estimated data are acceptable for decision-making purposes.

In the ICP metals analysis, the LCS recoveries were above the QC project criteria for aluminum (68%) and antimony (63%). Although not qualified for the LCS recovery outside of QC limits, the aluminum and antimony data may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis the MS/MSD recoveries for aluminum (135% [MSD only]), antimony (67% and 67%), barium (68% [MSD only]), calcium (56% and 168%), iron (-198% and -162%), magnesium (40% [MS only]), manganese (46% and 55%), potassium (150% and 154%), and silicon (46% [MSD only]) were outside of QC limits. For aluminum, calcium, iron, magnesium, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. The deficiency in the MS is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample. Antimony, barium, potassium, and silicon did not have mismatched spike and native concentrations in the MS. Although not qualified for MS recoveries outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the IC anions analysis, holding times were exceeded by more than twice the specified holding time for nitrate, nitrite, and orthophosphate. The nondetected results for these analytes are discussed above in the Major Deficiencies section. Although not qualified for the holding time exceedance, all detected nitrate, nitrite, and orthophosphate results may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the analysis for total nitrogen in nitrate/nitrite, contamination was detected in the MB at a concentration less than six times the MDL. Method blank contamination of this magnitude has no significant impact on the field sample results. The data are usable for decision-making purposes.

In the analysis for total nitrogen in nitrate/nitrite, the MS recovery was outside of QC limits at 53%. Although not qualified for the MS recovery outside of QC limits, the result for total nitrogen in nitrate/nitrite may be considered estimated. Estimated data are acceptable for decision-making purposes.

SDG JP0527

This SDG is composed of five statistical soil samples (J1RKM5 through J1RKM9) collected from the SPA on April 29, 2013. A portion of the SPA boundary had been modified, and five of the statistical sample locations (SPA-8 through SPA-12) required new statistical locations. The samples were analyzed for ICP metals, mercury, hexavalent chromium, IC anions, nitrate/nitrite, SVOCs, PAH, PCBs, TPH, and pesticides. Minor deficiencies are as follows:

In the SVOC analysis, the MS/MSD recoveries for 2,4-dinitrophenol (28% and 31%) were outside of QC limits. Although not qualified for the MS recovery outside of QC limits, all 2,4-dinitrophenol results may be considered estimated. Estimated data are usable for decision-making purposes.

In the pesticide analysis, there was no MS, MSD, or LCS for toxaphene. The laboratory typically quantitates toxaphene but does not include toxaphene in QA/QC samples. Although not qualified for the lack of MS, MSD, or LCS analyses, all toxaphene results may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery was below the QC project criteria for silicon (20%). Although not qualified for the LCS recovery outside of QC limits, all silicon data may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, zinc was detected in the MB at a concentration less than twice the MDL. Method blank contamination of this magnitude has no significant impact on the field sample results. The data are usable for decision-making purposes.

In the ICP metals analysis, the MS recovery for aluminum (1,080%), antimony (60%), iron (1,020%), manganese (135%), and silicon (18%) were outside of QC limits. For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. The deficiency in the MS is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample. Antimony and silicon did not have mismatched spike and native concentrations in the MS. Although not qualified for MS recoveries outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the ICP metals analysis, the RPD calculated from the laboratory duplicate analysis was above the QC limit for antimony (36%). Although not qualified for RPD results outside of QC limits, all antimony data may be considered estimated. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Estimated data are acceptable for decision-making purposes.

In the IC anions analysis, holding times were exceeded by less than twice the specified holding time for nitrate, nitrite, and orthophosphate. Although not qualified for the holding time exceedance, all detected nitrate, nitrite, and orthophosphate results may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the IC anions analysis, the MS recoveries were outside of QC limits for nitrate (199%), nitrite (0%), chloride (604%), and bromide (14%). All nitrite and bromide results were nondetects and were qualified as rejected as discussed in the Major Deficiencies section. Although not qualified for MS recoveries outside of QC limits, all nitrate and chloride results may be considered estimated. Estimated data are acceptable for decision-making purposes.

SDG JP0571

This SDG is composed of three focused soil samples (J1RN38 through J1RN40) collected from the former 100-D-83:1 pipeline footprint on May 29, 2013. The samples were analyzed for ICP metals, mercury, hexavalent chromium, IC anions, and nitrate/nitrite. Minor deficiencies are as follows:

In the ICP metals analysis, the LCS recovery was below the QC project criteria for silicon (8%). Although not qualified for the LCS recovery outside of QC limits, all silicon data may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries for aluminum (668%), antimony (55%), iron (2,923%), manganese (176%), and silicon (16%) were outside of QC limits. For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. The deficiency in the MS is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample. Antimony and silicon did not have mismatched spike and native concentrations in the MS. Although not qualified for MS recoveries outside of QC limits, all aluminum, antimony, iron, manganese, and silicon results may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the ICP metals analysis, the RPD calculations from the laboratory duplicate analysis were above the QC limits for aluminum (31%), antimony (82%), arsenic (50%), calcium (46%), copper (34%), nickel (46%), and sodium (38%). Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. Although not qualified for RPD results outside of QC limits, all aluminum, antimony, arsenic, calcium, copper, nickel, and sodium results may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the ICP metals analysis, calcium and cobalt were detected in the MB at a concentration less than three times the MDL. Method blank contamination of this magnitude has no significant impact on the field sample results. The data are usable for decision-making purposes.

In the IC anions analysis, holding times were exceeded by more than twice the specified holding time for nitrate, nitrite, and orthophosphate. The nondetected results for these analytes are discussed above in the Major Deficiencies section. Although not qualified for the holding time exceedance, all detected nitrate, nitrite, and orthophosphate results may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the ICP metals analysis, the MS recovery for orthophosphate (139%) was outside of QC limits. Although not qualified for MS recoveries outside of QC limits, all orthophosphate results may be considered estimated. Estimated data are acceptable for decision-making purposes.

SDG J01591

A remediated portion of the 100-D-77 waste site, the location of the former sample room of the 183-DR Filter Building, had been inadvertently omitted from the verification sample design (WCH 2013d). A verification sample for this location was included in the verification sample design for the 100-D-50:6, 183-DR Clearwell Drain Pipelines waste site (WCH 2012b).

This SDG is composed of five focused soil samples collected on September 4, 2012. Four of the samples (J1R156 through J1R159) were collected from the 100-D-50:6 subsite excavation area and one sample (J1R160) was collected from the former 100-D-77 sample room. Samples J1R156 through J1R159 were analyzed for ICP metals, mercury, hexavalent chromium, PAH, and PCBs. Sample J1R160 was analyzed for ICP metals, mercury, hexavalent chromium, anions, nitrite/nitrate, pH, and TPH. Only results related to sample J1R160 analyses are discussed. Minor deficiencies are as follows:

In the TPH analysis, the diesel range extended and diesel range organics were detected in the MB at less than twice the MDL. Method blank contamination of this magnitude has no significant impact on the field sample results. The data are usable for decision-making purposes.

In the ICP metals analysis, zinc was detected in the MB at less than twice the MDL. Method blank contamination of this magnitude has no significant impact on the field sample results. The data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery was below the QC project criteria for silicon (9%). Although not qualified for the LCS recovery outside of QC limits, all silicon data may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were outside the project acceptance criteria for aluminum (1,139%), antimony (47%), iron (2,187%), manganese (185%), and silicon (17%). For aluminum, iron, and manganese, the spiking concentration was insignificant compared to the native concentration in the sample from which the MS was prepared. The deficiency in the MS is a reflection of the variability of the native concentration rather than a measure of the recovery from the sample. Antimony and silicon did not have mismatched spike and native concentrations in the MS. Although not qualified for MS recoveries outside of QC limits, all associated results of these analytes may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the ICP metals analysis, the laboratory duplicate RPD calculations for antimony (43%) and cadmium (31%) were outside of QC limits. Although not qualified for RPD results outside of QC limits, all antimony and cadmium data may be considered estimated. Estimated data are usable for decision-making purposes.

In the analysis for total nitrogen in nitrate/nitrite, contamination was detected in the MB at a concentration less than twice the MDL. Method blank contamination of this magnitude has no significant impact on the field sample results. The data are usable for decision-making purposes.

In the IC anions analysis, holding times were exceeded by more than twice the specified holding time for nitrate, nitrite, and orthophosphate. The nondetected results for these analytes are discussed above in the Major Deficiencies section. Although not qualified for the holding time exceedance, all detected nitrate, nitrite, and orthophosphate results may be considered estimated. Estimated data are acceptable for decision-making purposes.

FIELD QUALITY ASSURANCE/QUALITY CONTROL

Relative percent difference evaluations of main sample(s) versus the laboratory duplicate(s) are routinely performed and reported by the laboratory. Any deficiencies in those calculations are reported by SDG in the previous sections.

Field QA/QC measures are used to assess potential sources of error and cross contamination of samples that could bias results. Field QA/QC samples, listed in the field logbooks (WCH 2012a, 2013b), are shown in Table D-1. The main and QA/QC sample results are presented in Appendix C.

Table D-1. Field Quality Assurance/Quality Control Samples.

Sample Area	Main Sample	Duplicate Sample	Split Sample
EXC-3	J1PW83	J1PW93	J1PWF8
SPA-5	J1R645	J1R653	J1R670

Field duplicate samples are collected to provide a relative measure of the degree of local heterogeneity in the sampling medium, unlike laboratory duplicates that are used to evaluate precision in the analytical process. The field duplicates are evaluated by computing the RPD of the sample/duplicate pair(s) for each COPC. Relative percent differences are not calculated for analytes that are not detected in both the main and duplicate sample at more than five times the target detection limit. Relative percent differences of analytes detected at low concentrations (less than five times the detection limit) are not considered to be indicative of the analytical system performance.

Split samples are collected to provide a relative measure of the variability in the sampling, sample handling, and analytical techniques used by commercial laboratories. The field main and split samples are evaluated by computing the RPD of the split samples for each COPC to determine the usability of the verification data. The U.S. Environmental Protection Agency Contract Laboratory Program duplicate sample comparison methodology, *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA 2004), is used as an initial test of the data from the splits. Only analytes that had values above five times the contract-required quantitation limit for both the main and split sample were compared. The calculation brief in Appendix C provides details on split pair RPD calculation. The RPD acceptance criteria for project-split samples is ≤35% (less than or equal to 35%).

The calculation brief in Appendix C provides details on duplicate and split pair evaluations and the RPD calculation.

The calculated RPDs for the field QA/QC duplicate samples were within the acceptance criteria of 30%, with the exception of acenaphthene (62.1%), benzo(a)anthracene (122.0%), benzo(a)pyrene (138.5%), benzo(b)fluoranthene (122.6%), chrysene (124.6%), fluoranthene (133.3%), phenanthrene (128.8%), and pyrene (144.4%) in the excavation area. All RPD calculations for the split analyses were within the acceptance criteria of 35% except for silicon (38.0%), acenaphthene (155.8%), benzo(b)fluoranthene (64.2%), benzo(ghi)perylene (45.4%), indeno(1,2,3-cd)pyrene (40.5%), and pyrene (35.4%) in the excavation area and silicon (165.4%) in the staging pile area. Elevated RPDs in the analysis of environmental soil samples are largely attributed to heterogeneities in the soil matrix and only in small part attributed to precision and accuracy issues at the laboratory. The data are usable for decision-making purposes.

A secondary check of the data variability is used when one or both of the samples being evaluated (main and duplicate) is less than five times the target detection limit (TDL), including undetected analytes. In these cases, a control limit of ±2 times the TDL is used (Appendix C) to indicate that a visual check of the data is required by the reviewer. In the duplicate sample analyses, TPH (diesel range); TPH (diesel range extended); beno(ghi)perylene, benzo(k)fluoranthene, dibenz(a,h)anthracene, fluorene, and indeno(1,2,3-cd)pyrene (PAH analysis); and benzo(a)anthracene, benzo(b)fluoranthene, chrysene, fluoranthene, phenanthrene, and pyrene (SVOC analysis) in the excavation area required this check. In the split samples analyses, TPH (diesel range); acenaphthylene and dibenz(a,h)anthracene (PAH analysis); and benzo(a)anthracene, benzo(b)fluoranthene, chrysene, fluoranthene, phenanthrene, and pyrene (SVOC analysis) in the excavation area required this check. A visual inspection of all of the data is also performed. No additional major or minor deficiencies are noted. The data are usable for decision-making purposes.

Summary

Limited, random, or sample matrix-specific influenced batch QC issues such as those discussed above are a potential for any analysis. The number and types seen in these data sets are within expectations for the matrix types and analyses performed. The DQA review of the 100-D-62, 100-D-77, and 100-D-83:1 waste site verification sampling data found that the analytical results are accurate within the standard errors associated with the analytical methods, sampling, and sample handling. The DQA review for the 100-D-62, 100-D-77, and 100-D-83:1 waste site concludes that the reviewed data are of the right type, quality, and quantity to support the intended use. The analytical data were found acceptable for decision-making purposes.

The verification sample analytical data are stored in the Environmental Restoration project-specific database prior to being submitted for inclusion in the Hanford Environmental Information System database. The verification sample analytical data are also summarized in Appendix C.

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